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DEPARTMENT OF THE ARMY



FM 31-11C-S



**SPECIAL FORCES
SOLDIER'S MANUAL
FOR
MOS 11C (SQI S)**

SEPTEMBER 1980

Field Manual
No. 31-11C-S

Headquarters
Department of the Army
Washington, DC, 2 September 1980

SPECIAL FORCES SOLDIER'S MANUAL
FOR MOS 11C (SQI S)

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The words "he," "him," "his," and "men," when used in this publication, represent both the masculine and feminine genders, unless otherwise specifically stated.

FM 31-11C-S

COMMANDER'S ATTENTION

This FM 31-11C-S Soldier's Manual should be made available to each Special Forces (SF) soldier in your detachment/organization assigned to duty positions 11C-S. It is designed to tell soldiers assigned to a Special Forces unit in these duty positions the tasks/skills in which they must be proficient.

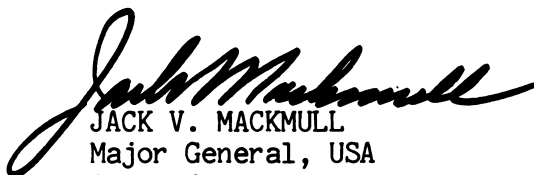
Several of the tasks in this manual duplicate those contained in the FM 7-11C1/2, 3, and 4 Soldier's Manuals. This duplication is necessary since a soldier filling duty position 11C-S may be lower in rank than E7. In addition, chapter 2 contains tasks which all Special Forces personnel, regardless of grade and MOS, must be able to perform.

The tasks in this manual do not replace those 11C tasks the soldier must perform at his skill level as shown in his basic MOS soldier's manual but are in addition to them.

Because of the difference in critical tasks performed by the soldier in a conventional duty position and the soldier with the same MOS in a Skill Qualification Identifier S (SQI S) duty position, the SQI S soldier is tested on tasks and equipment that are not always relevant to his duty position. To insure that this soldier is not placed at a disadvantage, beginning in 1981 25 percent of the tasks in his SQT will come from this manual.

Initially, this manual will be distributed at unit level, based on assigned strength in the 11C MOS. If additional manuals are needed by the unit for MOS study, libraries, or other training needs, requests may be sent directly to the US Army AG Publications Center, 2800 Eastern Boulevard, Baltimore, Maryland 21220.

This soldier's manual was prepared by the US Army Institute for Military Assistance (USAIMA).


JACK V. MACKMULL
Major General, USA
Commandant

RESERVE COMPONENTS

ARMY NATIONAL GUARD - ARMY RESERVE

This soldier's manual contains the critical tasks to be performed by the Active Army soldier in 11C MOS in an SQI S duty position on equipment available in the Active Army inventory.

Most tasks in this manual are applicable to you without changes. However, some tasks may require modification due to differences of equipment, facilities, and training time available to you.

Many tasks that you learned in BCT and AIT are in this manual. There are other critical tasks that you are responsible to learn on your own. Training references/materials are available and can be provided to you through your unit. This is where your initiative comes into play. It is to your advantage to take the initiative NOW. Your performance in your duty position will be based on your ability to perform all the critical tasks for which you are accountable.

CHAPTER 1

INTRODUCTION

HOW TO USE THE SOLDIER'S MANUAL FOR SQI S

COMMON SQI S TASKS

This soldier's manual for soldiers serving in an SQI S position contains tasks that each SF soldier must be able to perform in addition to those tasks for his skill level in his basic MOS. These tasks are listed under common SQI tasks and are contained in chapter 2. Although these tasks range from SL 1 through SL 4 for the conventional soldier, they are common tasks for the SF soldier.

TASKS FOR DUTY POSITIONS

Your duty position may require you to be able to do some additional tasks. These are contained in chapter 3, Special Forces Heavy Weapons Leader, and chapter 4, Conventional 11C Tasks Critical to 11C-S Duty Positions.

WHY THE SQI S MANUAL?

There is a difference in critical tasks performed by the soldier in a conventional duty position and the soldier with the same MOS in a Special Forces duty position. Therefore, beginning in 1981, 25 percent of the tasks in the 11C SQT for the SF soldier will come from this manual.

As a Special Forces soldier, you need to study this manual as well as your basic 11C Soldier's Manual to pass your SQT.

CHAPTER 2

SPECIAL FORCES COMMON TASKS

All Special Forces personnel, regardless of grade and MOS, must be able to perform the tasks covered in this chapter.

You will find several tasks are the same as in your basic MOS soldier's manual; for instance, several 11C tasks at skill levels 1, 2, 3, and 4 are in this chapter. But for you, the Special Forces soldier, these are common tasks.

NOTE: The FM 7-11C tasks were prepared for conventional operations and use the terms platoon, squad, and team. For Special Forces operations, terms should be changed to detachment, team, element, etc., as appropriate for the particular situation/mission; i.e., unconventional warfare (UW), special operations, or foreign internal defense (FID).

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031-503-2001

READ AND REPORT RADIATION DOSAGES

CONDITIONS:

In a nuclear environment (simulated) while masked and wearing all individual combat equipment, given an IM93/UD series pocket dosimeter with a preset radiation dosage.

STANDARDS:

Read and report the correct radiation dosage within 20 rads.

PERFORMANCE MEASURES:

1. The IM93/UD and IM93A/UD are total-dose pocket dosimeters capable of indicating total exposure to radiation on a scale of 0-600 rads (fig. 1). The IM93/UD series dosimeter is designed to be carried like a ballpoint pen and will allow the soldier to determine the total amount of radiation he has been exposed to over a given period of time. It is normally distributed to a representative number of squad or platoon members to allow the commander to determine the average radiation exposure within the entire unit.

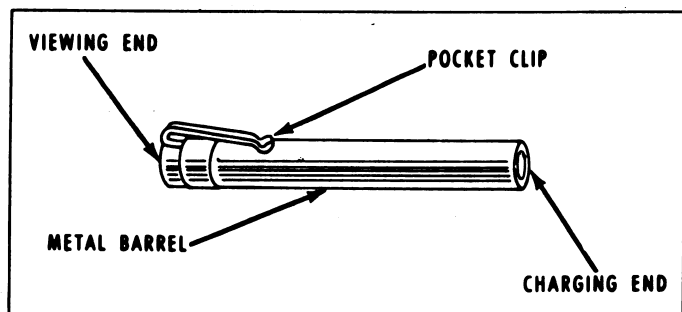


Figure 1

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2. To read the IM93/UD series pocket dosimeter:

- a. Remove the rubber cap from the charging end of the dosimeter.
- b. Point the dosimeter at a light source and hold the viewing end of the dosimeter to the eye.

- c. Read the value on the scale covered by the hairline (fig. 2).

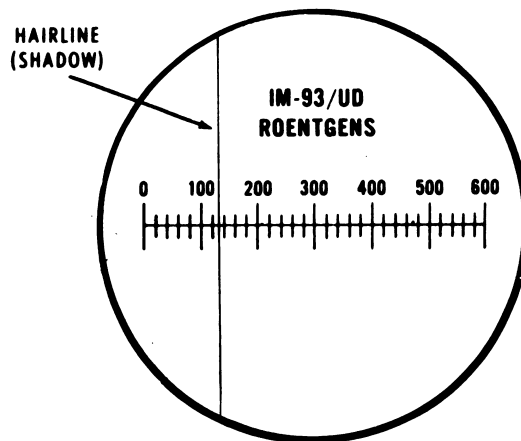


Figure 2

- d. Report the total number of rads indicated to your supervisor.

REFERENCES:

FM 21-40, NBC Defense, Oct 77

TM 11-6665-214-10, Operator's Manual: Radiacmeters, IM-9E/PD, IM-93/UD, and IM-93A/UD, and IM-147/PD, C1-3, Nov 62 (chap 4, page 20)

031-503-2002

DECONTAMINATE EQUIPMENT USING
ABC-M11 DECONTAMINATION APPARATUS

CONDITIONS:

In a simulated NBC environment, while masked and wearing all individual combat equipment and gloves, given a prefilled ABC-M11 decontamination apparatus and a contaminated (simulated) weapon.

STANDARDS:

Place the M11 decontamination apparatus into operation and decontaminate the weapon.

PERFORMANCE MEASURES:

NOTE TO TRAINERS: Fill the M11 with water instead of DS2 for training purposes. When task is complete, thoroughly dry the M11 to prevent rusting, and heavily oil the weapon to prevent it from rusting.

1. The M11 decontamination apparatus (fig. 1) has a 1 1/2-quart capacity and normally holds 1 1/3 quarts of DS2 decontamination solution. It is normally mounted in wheeled and tracked vehicles, to be used to decontaminate surfaces which must be handled to operate the vehicle or allow it to perform its mission (e.g., laterals, steering wheel, driver's seat, and combat door, hatches, etc.).

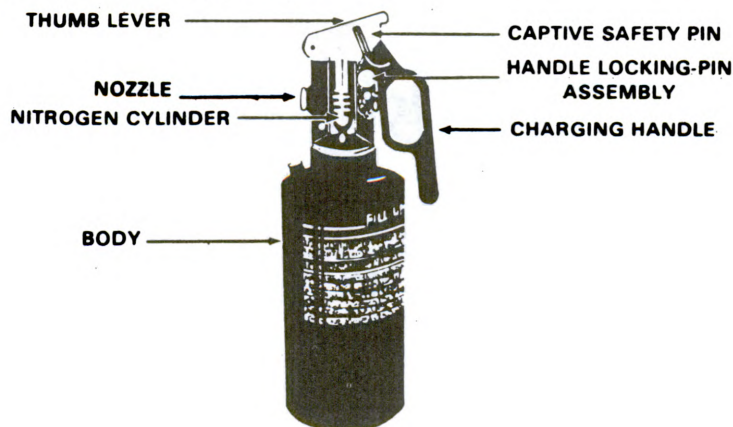


Figure 1

2. To operate a filled M11:

- a. Remove the captive safety pin.
- b. Grasp the M11 in one hand (fig. 2) and lift up on the charging handle with the other. You should hear a hissing noise which indicates the compressed gas from the nitrogen cylinder has entered and charged the M11.

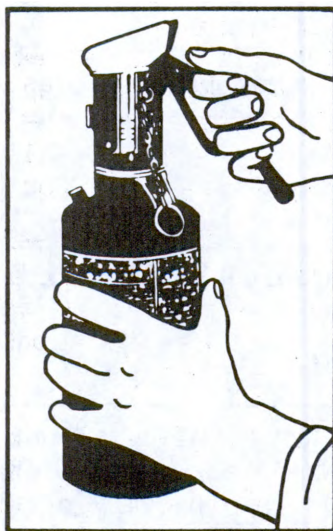


Figure 2

- c. Pull up on the charging handle, point the apparatus at the object to be decontaminated, hold it 6 to 8 inches away, and depress the thumb lever (fig. 3).

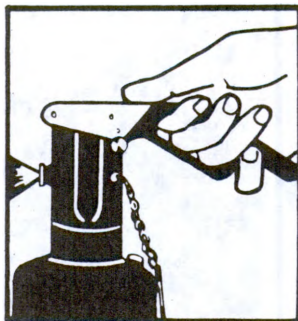


Figure 3

d. The charged M11 will last about 30 seconds, so care should be taken to prevent wasting the DS2.

e. Having sprayed the object to be decontaminated, interrupt the flow by removing your thumb from the thumb lever.

f. Depress the handle locking pin, lower the charging handle, and replace the captive safety pin.

.....
[WARNING: DS2 is highly corrosive. DO NOT SPRAY ON PERSONNEL
and avoid spraying fabric.
.....]

3. To decontaminate a contaminated weapon:

[NOTE: For training, the M11 can be filled with water. Care should be taken to dry it out thoroughly when finished to avoid rusting.]

a. Holding the charged and filled M11 6 to 8 inches from the weapon, depress the thumb lever and cover the weapon completely with the spray from the apparatus. Avoid getting spray on any surfaces that are not metal.

b. Wait 30 minutes (simulate).

c. Flush surfaces of weapon with water, taking care to avoid contact with the runoff.

d. Dry, clean, and lubricate weapon.

REFERENCES:

FM 21-40, NBC Defense, Oct 77

TM 3-4230-204-204-12&P, Operator's and Organizational Maintenance Manual for Decontaminating Apparatus, Portable, DS2, 1 1/2 Quart ABC-M11, Feb 78

PROTECT SELF WHILE CROSSING A CONTAMINATED AREA

CONDITIONS:

You will be given:

A mission which requires you to cross a contaminated area.

All standard protective clothing and equipment.

Operational Exposure Guidance (OEG) has been established by the commander.

STANDARDS:

Cross the contaminated area safely.

PERFORMANCE MEASURES:

1. Put on all protective clothing and equipment, making sure all closures are fastened.
2. Fasten ABC-M8 detector paper (or Liquid Agent Detector) on your clothing/equipment.
3. Report the reading on the dosimeter to your supervisor.
4. Cross the areas as fast as possible, riding in a vehicle if available.
5. If a vehicle is available and time permits, place sandbags on the floor for shielding and travel buttoned-up mode.
6. Select routes along high ground and avoid contact with surfaces such as buildings, debris, woods, shrubbery, tall grass, and puddles which tend to hold the agents.
7. Try not to stir up dust.
8. Use the Automatic Chemical Agent Alarm and IM-174 Radiacmeter to continuously monitor for contamination.

9. After crossing, if the mission permits, use your detection equipment to determine if decontamination is required; decontaminate, if necessary.

10. Read the dosimeter and report the reading to your supervisor.

REFERENCES:

FM 3-12, Operational Aspects of Radiological Defense, C1 and 2, Aug 68, (chap 5, para 5 and 6)

FM 21-40, NBC Defense, Oct 77

FM 21-41, Individual NBC Defense, Oct 77 (pages 69 and 70)

031-503-3006

DECONTAMINATE UNIT EQUIPMENT

CONDITIONS:

In a field or garrison location, given unit equipment contaminated with an identified chemical or radiological hazard (simulated) and the requirement to select an appropriate means of decontamination.

STANDARDS:

Select the appropriate decontaminant IAW performance measures below.

PERFORMANCE MEASURES:

1. A decontaminant is anything used to reduce the hazard caused by chemical, biological, or radiological contamination so the mission can be accomplished.

2. Chemical decontaminants include:

a. STB decontaminating agent (bleach). STB neutralizes liquid chemical agents by chemical action. Pure STB in direct contact with liquid blister agents reacts violently and can cause a fire. This is why STB is used in a dry mix (with dirt) or as a wet mix (with water). STB also corrodes metals. Wet mix is effective against biological agents.

[WARNING: DO NOT USE STB FOR PERSONNEL DECONTAMINATION. DO NOT
MIX WITH DS2 BECAUSE A FIRE MAY RESULT. Wear
protective mask and gloves when handling STB.]

b. DS2 decontaminating agent. DS2 neutralizes all known chemical agents and most biological agents. It reacts with G-agents, V-agents, and blister agents to reduce their hazards within 30 minutes after application. Ready-to-use solution is available in 1 1/3-quart cans and 5-gallon drums. DS2 can be applied easily with the 1 1/3-quart M11 decontaminating apparatus, a broom, or a swab. One application of DS2 should be applied to the contaminated surface and, after 30 minutes, flushed with water.

WARNING: DO NOT USE DS2 FOR PERSONNEL DECONTAMINATION. DO NOT MIX WITH STB BECAUSE A FIRE MAY RESULT. DS2 IS FLAMMABLE. Avoid inhalation of vapors or contact of solution with the skin or eyes. Wear protective mask when using DS2.

c. Water or steam. It removes dirt and grease containing chemical agents or radioactive material. Hot soapy water destroys G-agents and physically removes other chemical and radiological contamination. Water or steam is applied under high pressure; action of hot water is speeded by using soap or other detergent.

WARNING: Water and condensed steam used to remove contamination should be drained into a sump and properly marked. If necessary to drain into a stream, friendly units downstream must be notified.

d. Hot air. It evaporates liquid chemical contaminants. Hot air is used in special situations, such as decontamination of delicate instruments contaminated with liquid agents or decontamination of aircraft cabins by engine heaters.

CAUTION: Temperature and air pressures used should be safe for particular equipment involved. Blown air will itself be contaminated by the chemicals it removes.

e. Weathering. Exposure of chemically contaminated equipment to the sun, air, and rain will decontaminate the equipment if sufficient time is allowed.

3. Chemical Decontamination of Unit Equipment. Unit equipment used by individuals is decontaminated by individuals as soon after contamination as the situation permits, as described below.

a. Vehicles. Vehicles that are lightly contaminated (pinhead-size spots at least one-fourth inch apart), as determined by chemical agent detector paper, may be decontaminated by airing. Each tactical vehicle is authorized one M11 portable decontaminating apparatus that contains 1 1/3 quarts of decontaminating agent DS2. It is used to decontaminate parts of the vehicle that must be touched during vehicle operation, such as controls.

(1) If the driver of the vehicle realizes that the vehicle is contaminated, he and other occupants mask and continue their mission until the situation permits decontamination outside the contaminated area.

(2) The vehicle is decontaminated with DS2, soapy water, solvents, or slurry. The M11 decontaminating apparatus is not intended for decontamination of the entire vehicle; one filling of DS2 is sufficient for emergency decontamination of the operator controls. The apparatus is used by tank crews and armored personnel carrier drivers to decontaminate those parts of the vehicle that will be touched by personnel during the mission; for example, areas touched when entering or leaving the vehicle. If sufficient DS2 is not available, gasoline, mud, rags, or any other expedient may be used. (These expedients do not neutralize the hazard. They just remove it.) Contaminated wood surfaces and tires are decontaminated with slurry.

b. Crew-served weapons. Crew-served weapons are decontaminated by using the methods described in paragraph a. If necessary, the bore can be decontaminated by using cleaning solvent or hot soapy water. Ammunition is decontaminated with DS2 solution, wiped with gasoline-soaked rags, and then dried. If DS2 is not available, ammunition may be washed with cool soapy water, rinsed, and then dried thoroughly. Ammunition corroded from contamination is disposed of, particularly if the brass parts cannot be cleaned. Dry STB (bleach) must not be used on ammunition contaminated with mustard-type blister agents because when mixed they may ignite and start a fire. After decontamination, weapons are disassembled, washed, rinsed, dried, and oiled to prevent corrosion.

c. Optical instruments. Optical instruments are decontaminated by blotting with rags, wiping with an organic solvent (lens-cleaning solvent only is used for the lens), and then allowing them to air. If available, hot air is used to decontaminate most optical instruments.

d. Communication and radar equipment. Communication equipment is decontaminated by using hot air, if available. The next best method is by airing or weathering. The metal parts of field telephones and radios are decontaminated with DS2 and then wiped with rags. Heat-producing equipment such as electrical devices that contain tubes normally is decontaminated by the heat given off during operation.

4. Radiological Decontamination of Unit Equipment. The three methods of radiological decontamination are aging, sealing, and removing. The method most desirable for decontamination of vehicles and equipment is aging. This method can be used only when there is not an immediate need for the vehicle and the contaminant is not too long-lived. Brush loose, dry contamination from the vehicle before starting the aging process. If the vehicle is required for immediate use, brush loose contamination from the surface and clean the vehicle by

washing or scrubbing with steam or water and detergents. More extreme procedures include the removal of the protective finish with organic solvents and solutions or strong caustic solutions. These solvents and solutions should not be allowed to come in contact with rubber articles. Special attention should be paid to areas near the driver and to the controls.

REFERENCES:

FM 21-40, NBC Defense, Oct 77

TM 3-220, Chemical, Biological, and Radiological (CBR) Decontamination, C1, 2, Nov 67 (chap 1, pages 5-8, para 9; chap 2, pages 23-31, para 24; app B)

SUPERVISE USE OF UNIT RADIAC EQUIPMENT

CONDITIONS:

In a simulated NBC environment, given radiacmeters AN/PDR-27, IM-174/PD or IM-174A/PD, IM-93/UD or IM-93A/UD, unit survey and monitoring team, and a requirement to begin radiological monitoring.

STANDARDS:

1. Insure the selection of the correct radiacmeter for the mission.
2. Conduct a ground survey IAW performance measures below.

PERFORMANCE MEASURES:

1. Instruments (fig. 1).
 - a. The IM-174/PD and IM-174A/PD are used for area monitoring and survey. They measure gamma radiation in units from 1 to 500 rad/hr. They are dose-rate instruments.
 - b. The AN/PDR-27 () is used to monitor personnel, food, and equipment. It will measure gamma radiation and detect beta. It is a dose-rate instrument.
 - c. The IM-93 ()/UD is used to measure total radiation dosages received. It measures gamma radiation up to a total dose of 600 rads. It is a total dose instrument.
2. Missions.
 - a. Monitoring (does not divert personnel from regular duties).
 - (1) Periodic--routinely conducted during nuclear warfare at a designated point at least once each hour.
 - (2) Continuous--initiated when periodic monitoring indicates above 1 rad/hr, when a fallout warning is received, when moving, when a nuclear burst is observed, or on order.

b. Survey--a directed effort to determine the degree and extent of nuclear radiation. Takes personnel away from their basic mission.

3. Tactical Dosimetry. The tactical dosimeters are read at least once daily. The difference between the previous reading and the current reading is obtained for each dosimeter. These values are averaged, rounded off to the nearest 10 rads, and reported.

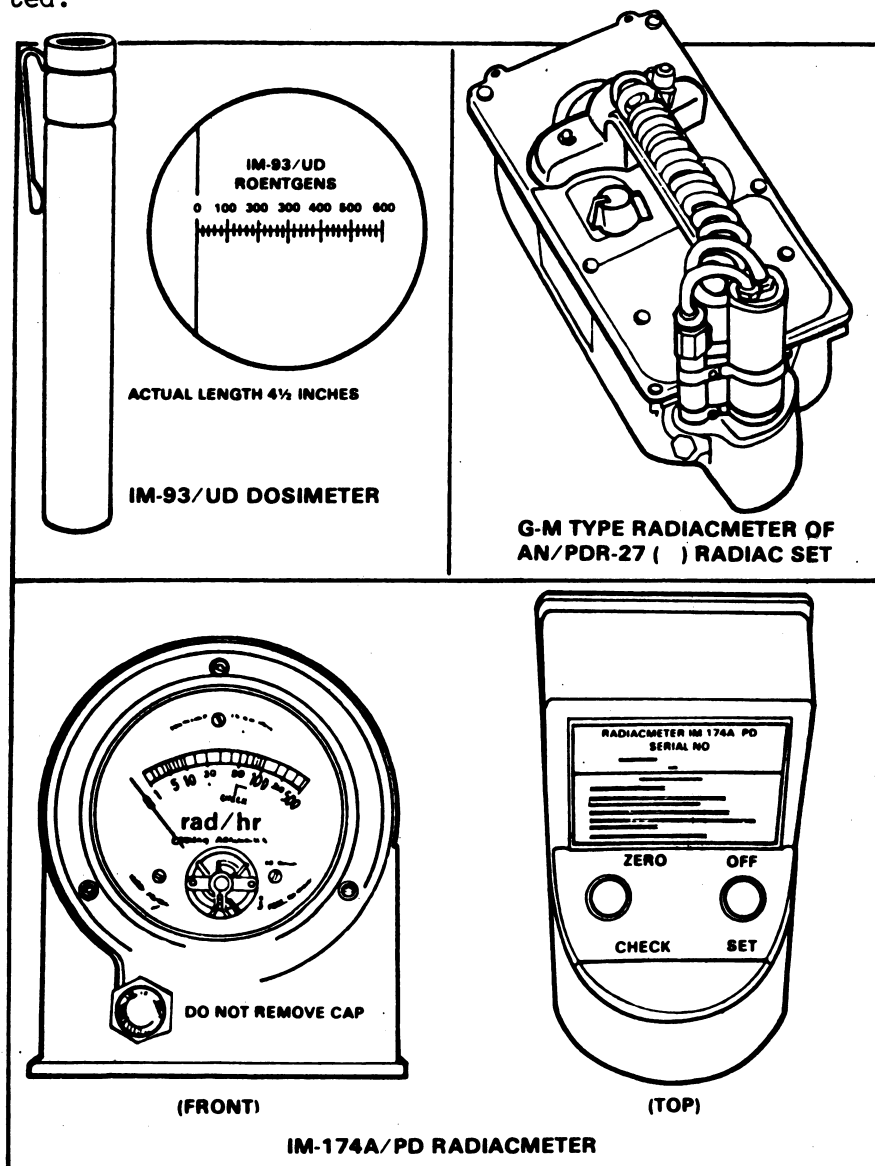


Figure 1. Radiac instruments.

4. Radiological Surveys. Radiological survey is the directed effort to determine the extent and dose rates of radiation in a specified area. There are two types of survey:

a. Air--which provides the most rapid means of collecting data and exposes the least number of personnel to the least amount of radiation.

b. Ground--which takes longer, exposes more personnel to more radiation, but is independent of weather conditions, can be conducted at night, and provides more accurate data.

c. There are three types of ground surveys:

(1) Point--measurements are taken only at preselected points in a given area.

(2) Route--measurements are taken at regular intervals over a predetermined route through a given area.

(3) Preselected dose-rate--a predetermined route is followed and locations are plotted where a given preselected dose rate is observed. Of these, the route method will be the one most often used.

d. Surveys are performed by one or more radiological survey parties and a control party. A ground survey party includes a monitor, who operates a dose-rate meter and records all survey data, and an assistant, who may be a driver or radio operator or both. Additional personnel may be included in a survey party for security or other reasons. The control party directs the survey, collects the data reported, and assembles the data into a usable form. The control party and survey parties are usually organized and equipped with unit resources.

e. As a rule, company-size units organize and train at least two survey parties (primary and alternate) for each dose-rate survey meter; only one party will be equipped with a survey meter. Survey parties are organized to use organic vehicles that provide maximum protection against nuclear radiation; for example, armored vehicles for mechanized units. Air-ground correlation factors and correlation factors for vehicles and structures are given in FM 3-12.

5. Operation Exposure Guidance (OEG). OEG is normally determined by a higher level command and gives a unit the means to determine how much radiation it can be exposed to with little or no risk. It is calculated from the unit's radiation history. That is, it is based upon how much total radiation the unit has been exposed to so far. For example, the total dose a unit may

receive might be 150 rads. If the unit radiation history says that the unit has already been exposed to 75 rads, then it can be exposed to only 75 rads more. It is very difficult to predict whether the personnel on a survey will receive no more than 75 rads. But they must have a way to determine whether they are receiving too much radiation. They can if they know the TURN BACK DOSE RATE (R_{tb}) and the TURN BACK DOSE (D_{tb}).

a. The TURN BACK DOSE RATE (R_{tb}) is figured from the following formula:

$$R_{tb} = \frac{2 \times \text{OEG} \times \text{speed}}{\text{distance}}$$

The commander has informed you that, due to the previous radiation exposure of the unit, the operation exposure guidance (OEG) is set at 20 rads. The survey is to be conducted at a speed of 10 mph. The distance to be covered by the survey is 5 miles. Using the formula:

$$R_{tb} = \frac{2 \times 20 \text{ rads (OEG)} \times 10 \text{ mph}}{5 \text{ miles}} = 80 \text{ rads/hr}$$

The TURN BACK DOSE RATE then is 80 rads/hr.

When a survey party encounters the TURN BACK DOSE RATE, unless instructed otherwise it will leave the survey area immediately by the same route it came.

b. TURN BACK DOSE (D_{tb}) is figured from the following formula:

$$D_{tb} = \frac{\text{OEG}}{2}$$

Using the OEG (20 rads) given by the commander, we find that the TURN BACK DOSE (D_{tb}) = $\frac{20 \text{ rads (OEG)}}{2} = 10 \text{ rads}$.

When the survey party encounters this dose and the dose rate is increasing as the survey party progresses, unless otherwise instructed the survey party will immediately leave the survey area by the route on which it came.

6. To supervise the conduct of a survey mission:

- a. Determine the area to be surveyed.
- b. Organize the survey and control as required.

c. Plan for the type of survey to be conducted; i.e., point, route, or predetermined dose rate.

NOTE: Planning the details of the survey should be accomplished with the NBC NCO.

d. Obtain OEG and calculate TURN BACK DOSE RATE (R_{tb}) and TURN BACK DOSE (D_{tb}).

e. Secure adequate transportation. Armored personnel carriers are best suited for ground survey since they afford the best protection for survey personnel.

f. Coordinate with all adjacent and subordinate units in the area of operations.

g. Become familiar with the individual exposure history of all survey personnel.

h. Brief the survey and control parties.

i. Conduct the mission.

REFERENCE:

FM 21-40, NBC Defense, Oct 77

FM 31-11C-S

051-192-1501

NEUTRALIZE ENEMY MINES

CONDITIONS:

Given a field location with varied terrain, a (dummy) mine(s), 50-meter rope with grapnel, 1 pound of C4 or TNT, four blasting caps, 10 meters of time fuse, and incendiary material. Situation requires you to help clear a mine(s).

STANDARDS:

The mine(s) will be detonated utilizing the following methods:

1. Hand-placed charges when access to the mine(s) can be gained.
2. Grapnels when engaging tripwire or tilt rod mines.
3. Vegetation fires only as a last resort to breach a minefield and when explosives and grapnels are not available.

PERFORMANCE MEASURES:

1. Mine Destruction, Removal, and Neutralization.
 - a. Before a mine is destroyed or removed, traffic will be stopped. All personnel will be cleared to a safe distance of 300 meters.
 - b. With standard demolition procedures as referenced in FM 5-25, mines and booby traps can be destroyed in place. A 1-pound block of TNT or 1-pound block of plastic explosive (C4) placed on top is enough to detonate a mine.
 - c. If it is decided that the mine must be removed, specially qualified soldiers should be tasked to remove it. This may be the case when the mine may damage a road, bridge, culvert, or civil structure to excess. Mines of special intelligence value may have to be removed for study instead of being destroyed in place.

d. If EOD personnel are not available, the mine may be removed by grappling hooks (grapnel) and rope from a protected position.

e. If the mine is detonated, check the crater for other mines. When the crater is clear, measure its size to learn the charge weight of the mine.

f. Safety.

(1) Flak jackets and steel helmets will be worn, with the exception of mine detector operators.

(2) Only one person will be allowed at the location of a suspected mine.

(3) All mines and explosive devices will be assumed to be equipped with antihandling devices until proven otherwise.

(4) All troops in the area will be cautioned not to run and move only in areas previously cleared.

g. Personnel in a minefield will NOT:

(1) Divide responsibility (senior man is responsible for all actions).

(2) Take chances.

2. Use of Grapnels (fig. 1). This is the safest method of destroying tripwire- or tilt rod-fused mines.

a. Tripwire- and tilt rod-fused mines can be detonated by throwing a grapnel with rope attached and pulling it back to detonate the mines.

b. A 50-meter rope is attached to the grapnel for handthrowing; throw grapnel and rope past mine.

c. Cover should be sought before grapnel and rope touch the ground in the event that their impact may detonate the mine.

d. Pull grapnel back toward you while remaining in a protected position until the mine is detonated.

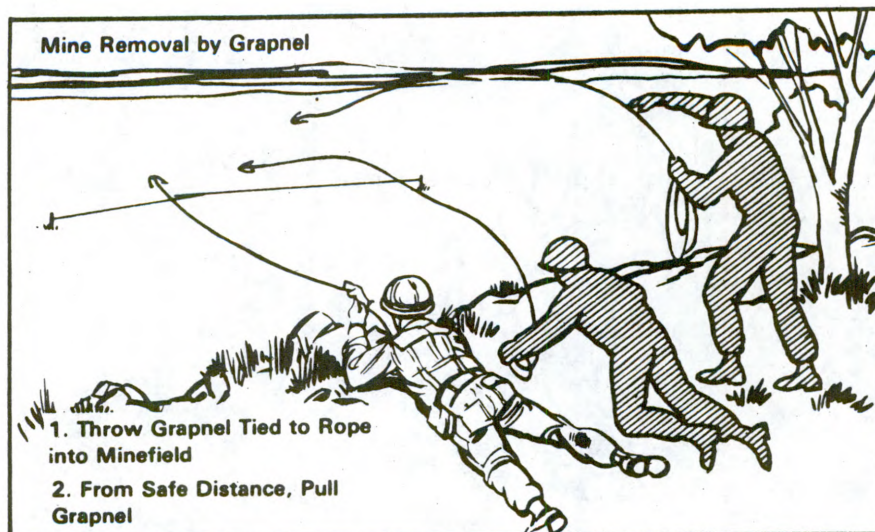


Figure 1

NOTE: If the mine does not detonate after pulling it from its emplacement, wait 5 minutes before leaving cover and approaching the mine. The mine should then be destroyed by hand-placed charges.

3. Hand-Placed Charges (fig. 2).

a. Procedures for priming demolitions for detonation are contained in tasks:

- (1) Prime a demolition block nonelectrically.
- (2) Prime a demolition block electrically.
- (3) And in FM 5-25, chapter 2.

b. A 1-pound charge of TNT or C4 placed alongside or on top is sufficient to detonate one mine.

c. Prepare charge and place alongside or on top of mine.

d. Light time fuse and move to safe position.

NOTE: Insure time fuse length will give you adequate time to return to protected position.



Figure 2

4. Use of Rope (fig. 3).

a. Prepare an A-frame and position it near the mine to be detonated.

b. Place a rope through the A-frame.

c. Extend the rope to a cleared, covered position, at least 50 meters from the mine.

d. Uncover only enough of the mine to expose a suitable part to which the end of the rope or a grapnel may be attached.

e. Tie the end of the rope to a hook or projection on the mine. If there is no projection, engage a hook of a grapnel under the bottom side of the mine opposite the direction of pull.

NOTE: Use care not to disturb the mine when uncovering and attaching grapnel or rope to the mine.

f. Move to the covered position and pull the mine from the hole.

NOTE: If no covered position is available, use an armored vehicle (if available) or lie prone behind a stump, tree, or log or get in a ditch before attempting to pull the mine from the hole.

g. If the mine does not detonate, wait 5 minutes before leaving cover and approaching the mine. Then check the hole for additional mines.

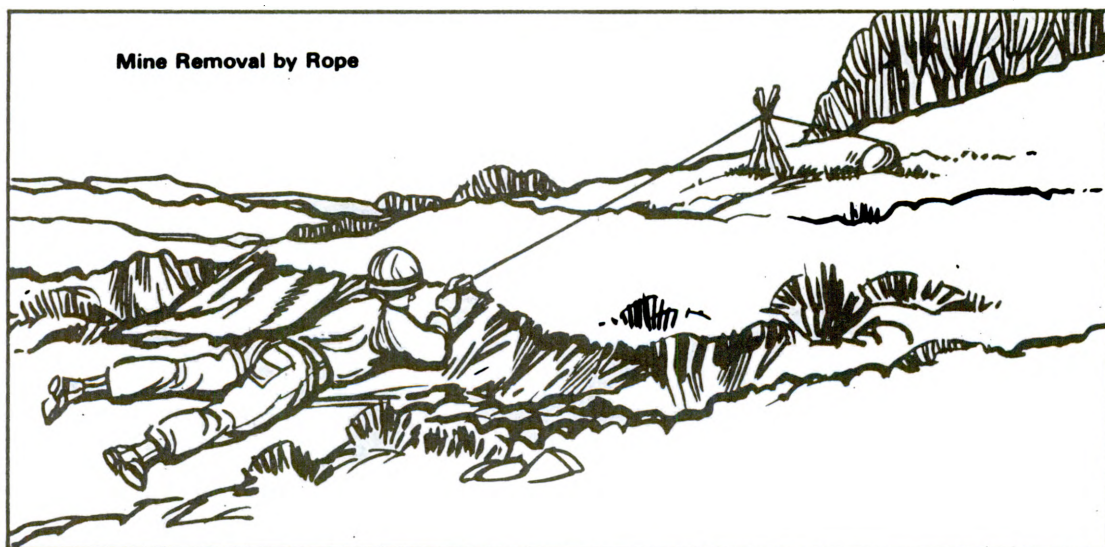


Figure 3

5. Detonate by Burning. Using incendiary material, set fire to the vegetation surrounding a mine (field) from the upwind side.

NOTE: This method is the least recommended method because it may not destroy all mines, and those remaining must be located and marked; furthermore, these mines will be highly sensitive.

6. Use of Weapons Fired Against Mines. Engage mine from a protected position.

REFERENCES:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 2, page 2-1)
 FM 20-32, Mine/Countermining Operations at Company Level, Nov 76 (chap 18, page 99, para 18-8 and 18-10)

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051-193-1003

PRIME A DEMOLITION BLOCK NONELECTRICALLY

CONDITIONS:

Under any environmental conditions, with a completed nonelectric detonating assembly (with and without a priming adapter), demolition blocks (with and without threaded cap well), an M2 crimper, and string.

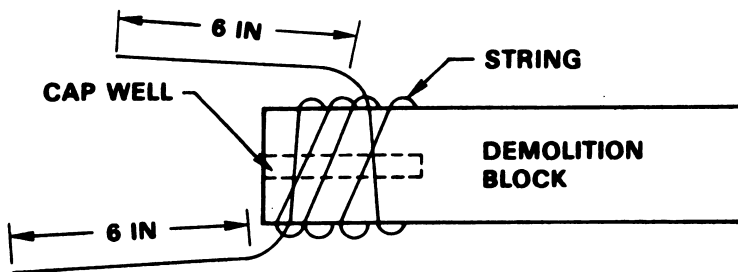
STANDARDS:

The charge will be primed as follows:

1. Blasting cap will be inspected for foreign material.
2. Blasting cap/time fuse will be securely fastened to the demolition block.
3. The charge will detonate when fired.

PERFORMANCE MEASURES:

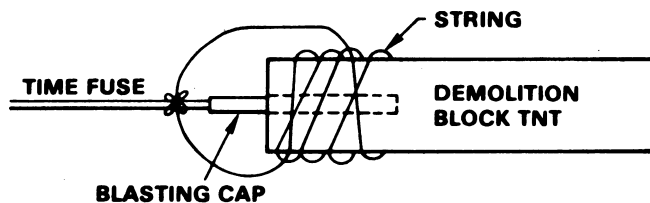
1. Prime a demolition block with a threaded cap well and priming adapter available as follows:
 - a. Inspect cap well for foreign material.
 - b. Insert cap into cap well.
 - c. Screw the adapter into the cap well.
2. Prime a demolition block with a threaded cap well and no priming adapter available as follows:
 - a. Inspect cap well for foreign material.
 - b. Wrap a string tightly around the demolition block and tie it securely, leaving about 6 inches of loose string on each end after making the tie.



c. Insert a blasting cap with fuse attached into the cap well.

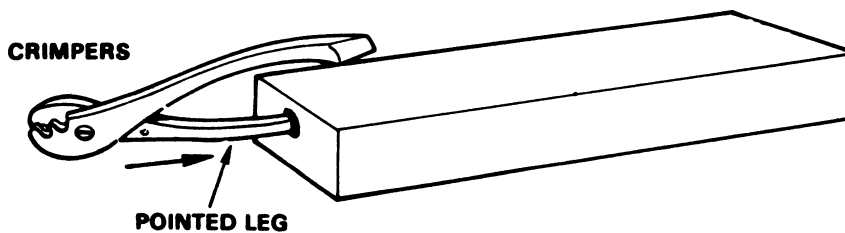
d. Tie the loose string around the fuse to prevent the blasting cap from being separated from the block.

NOTE: Do not tie the string so tight that powder train is broken in the fuse.

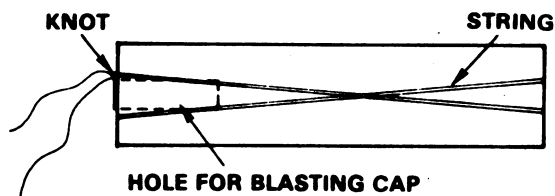


3. Prime a demolition block without threaded cap well as follows:

a. Make a hole in the end of the demolition block with the pointed handle on the M2 crimpers large enough to contain the blasting cap.



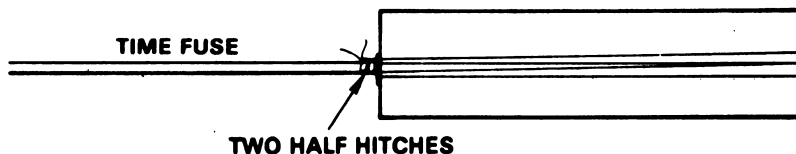
b. Using string, wrap several turns around the block and tie any knot. Position the tie so it will be at the top of the hole when the fused cap is inserted.



c. Insert fused cap into hole.

NOTE: Never try to force a cap into an expedient cap well that is too small to admit it easily. Remove cap and enlarge hole.

d. Tie string around the time fuse at the top of hole with two half hitches.



REFERENCE:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 2, page 2-17, para 2-17)

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PRIME DEMOLITION BLOCK ELECTRICALLY

CONDITIONS:

Under any environmental conditions (except for electrical storms, in the vicinity of FM radio transmissions, or other static electricity outputs that could detonate electric blasting caps), with firing wire, tested electric blasting caps, priming adapter, demolition blocks (with and without threaded cap well), and M2 crimper.

STANDARDS:

The charge will be primed IAW performance measures so that it detonates when fired.

PERFORMANCE MEASURES:

1. To prime a demolition block with a threaded cap well and priming adapter available (fig. 1).
 - a. Inspect cap well for foreign material.
 - b. Untwist the free ends of the lead wire and fasten them to the firing wire.
 - c. Pass the lead wires through the slot of the adapter and pull the cap into place in the adapter.
 - d. Insert the cap into the cap well of the block and screw the adapter into place.

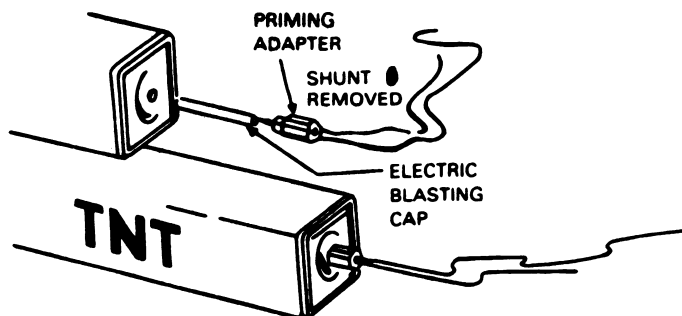


Figure 1

2. To prime a demolition block with a threaded cap well and no priming adapter available (fig. 2).

a. Inspect cap well for foreign material.

b. Untwist the free ends of the lead wire and fasten them to the firing wire.

c. Insert the electric cap into the cap well and tie the lead wires around the block with two half hitches or a girth hitch. Allow some slack in the wires between the blasting cap and the tie to prevent any pull on the blasting cap.

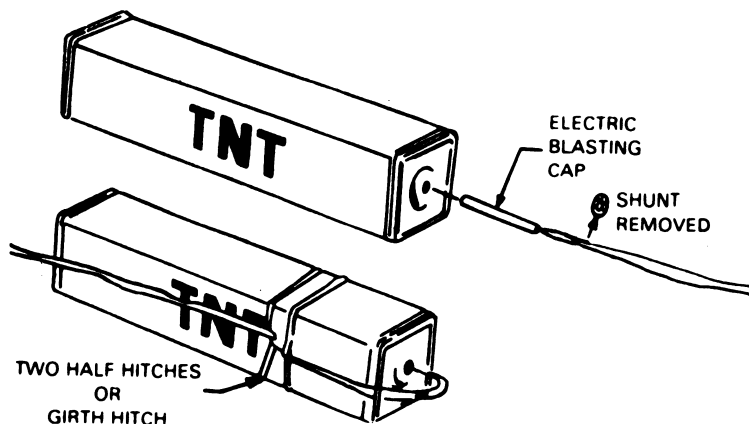


Figure 2

3. To prime a demolition block without a threaded cap well (fig. 3).

a. Make a hole in the end of the demolition block with a pointed nonsparking instrument or the pointed handle on the M2 crimpers large enough to contain the blasting cap.

b. Follow steps in performance measure 2.

NOTE: Never try to force a cap into an expedient cap well that is too small to admit it easily. Remove cap and enlarge hole.

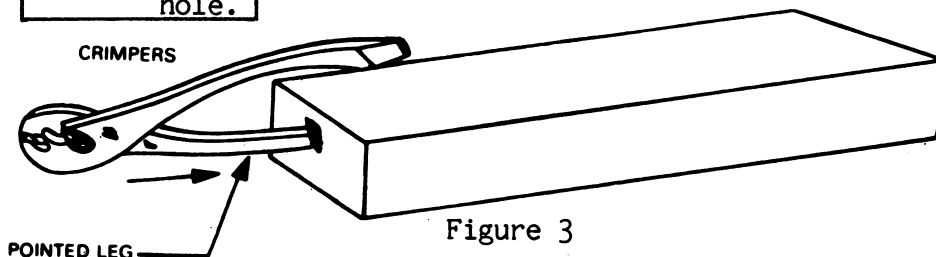


Figure 3

REFERENCES:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 2, page 2-19, para 2-18b)

TEC Lesson 645-093-7321-F, Prepare Electric Firing System

FM 31-11C-S

051-193-1501

PREPARE AND DETONATE EXPLOSIVES USING DETONATING CORD

CONDITIONS:

Under any environmental conditions, with designated explosives, detonating cord, and appropriate tools and equipment.

STANDARDS:

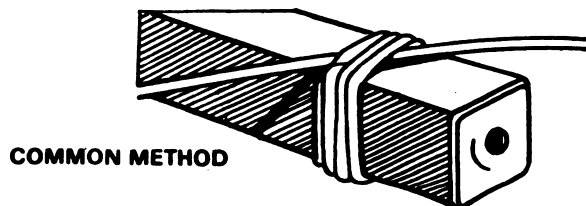
The charge will be primed IAW the performance measures so that it detonates when fired.

PERFORMANCE MEASURES:

1. To prime demolition blocks:

a. The method which offers the greatest assurance of detonation is to fix a nonelectric blasting cap to the end of the detonating cord and place it in the demolition block similar to nonelectric priming methods.

b. The common method is to lay one end of a 4-foot length of detonating cord at an angle across the explosive. The running end is then given three wraps around the block and the end laid at an angle. On the fourth wrap, slip the running end under all wraps parallel to the other end and draw tight.



2. To prime plastic explosives:

a. When priming explosives with detonating cord, form either the (a) overhand, (b) triple roll, or (c) Uli knot.



(a) OVERHAND KNOT



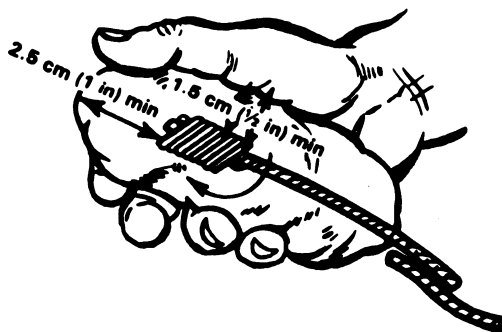
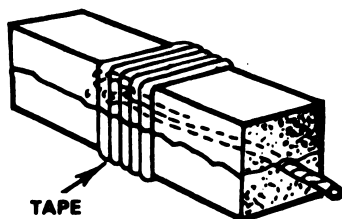
8 wraps minimum

(c) ULI KNOT



(b) TRIPLE ROLL KNOT

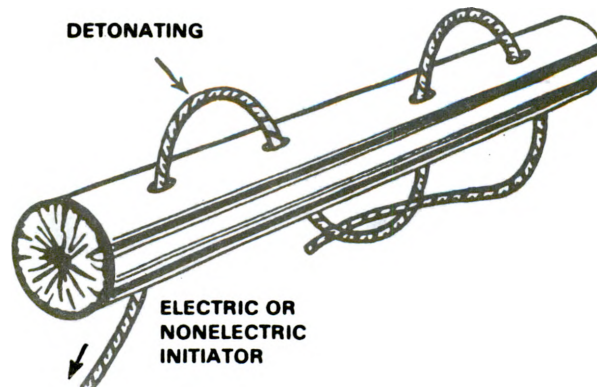
b. Then insert the knot into a block of explosive or a molded piece of explosive as shown. In either case, insure that there is at least one-half inch of explosive on all sides of the knot. (When using the Uli knot, a minimum of 1-inch of explosive must be on the end of the knot.)



3. Prime Dynamite.

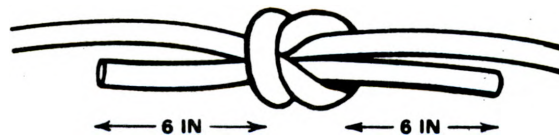
a. Dynamite cartridges may be primed with detonating cord by attaching a nonelectric blasting cap to the end of the detonating cord and following any of the methods for nonelectric priming.

b. Dynamite may also be primed by lacing the detonating cord through it. This is used chiefly in boreholes, ditching, or removal of stumps. Punch four equally spaced holes through the dynamite cartridge and lace the detonating cord through them as shown.

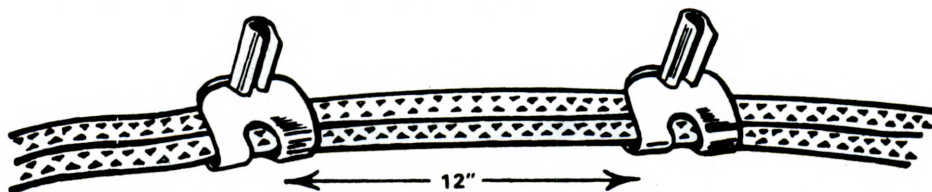


4. Splicing the Ends of Detonating Cord.

a. A square knot pulled tight is used to splice the ends of detonating cord. At least a 6-inch length should be left free at both sides of the knot. When fabric is used to cover the detonating cord, the fabric must not be removed.

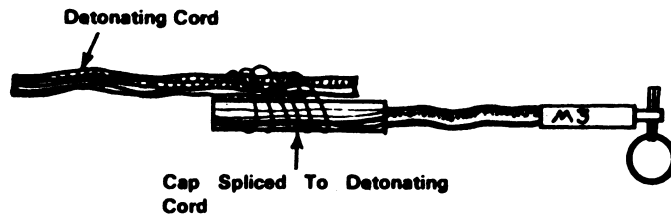


b. Ends of detonating cord are spliced by overlapping them about 12 inches, using two clips, one at each end of the overlap, and bending the tongues of the clips firmly over both strands. The connection is made secure by bending the trough end of the clip back over the tongue.



5. To attach an electric or nonelectric (initiation) detonating assembly, splice the cap of either detonating assembly to the detonating cord using an M1 detonating cord slip, string, or adhesive tape.

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REFERENCES:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 2, pages 2-11 thru 2-12, para 2-10 and 2-12)

TEC Lesson 645-093-7322-F, Prepare Detonating Cord Firing System

051-193-1502

CLEAR DEMOLITION MISFIRES (ABOVE GROUND)

CONDITIONS:

Given a 1-pound electric or nonelectric primed charge; an electric or nonelectric 1- or 2-pound charge that has not been tamped, located above ground; blasting machine; galvanometer; and a demolition pit.

NOTE: "Tamped" is defined as: material that has been packed around a charge to retain its explosive force.
--

STANDARDS:

Misfires will be cleared in accordance with applicable performance measures below to prevent premature detonation of the misfired demolition charge.

PERFORMANCE MEASURES:

1. To clear a nonelectric misfire:
 - a. Wait 30 minutes before investigating the cause of the misfire.
 - b. Place a 1-pound charge as close to the misfire as possible without disturbing it.
 - c. For a nonelectrically primed charge, light the time fuse and move to a safe area.
2. To clear an electrical misfire:
 - a. Check the firing wire connection to the blasting machine or power-source terminals to be sure that the contacts are good.
 - b. Make two or three more attempts to fire the circuits.
 - c. Change the blasting machine or power source and attempt to fire again.

d. Disconnect the firing wires (shunt the wires to avoid possible static electric detonation) and investigate immediately.

e. Check the entire circuit, including the firing wire, for breaks and short circuits.

f. Place a new 1-pound electrically primed charge as close to the misfire as possible.

g. Move back to the firing position and fire the charge.

REFERENCE:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 2, sec I & II, page 2-1)

051-202-1001

CAMOUFLAGE/CONCEAL SELF AND INDIVIDUAL EQUIPMENT

CONDITIONS:

During daylight, given camouflage paint stick(s), individual weapon, load-bearing equipment (LBE), helmet complete with accessories, a snowsuit (white sheet or mattress cover) if appropriate, burlap garnishing strips or cloth strips, charcoal or burnt cloth residue, and mud (if appropriate to area).

STANDARDS:

Within 15 minutes, shade shiny areas of exposed skin with dark color and shadow areas with light color. Clothing, LBE, and weapon outlines will be altered and irregular patterns added to blend with the predominant color of the background in the area.

PERFORMANCE MEASURES:

1. Guide for Skin Camouflage (fig. 1). Exposed skin reflects light and attracts the enemy's attention. Even very dark skin will reflect light because of its natural oil. Camouflage face paint sticks are issued in three standard two-tone sticks as follows:

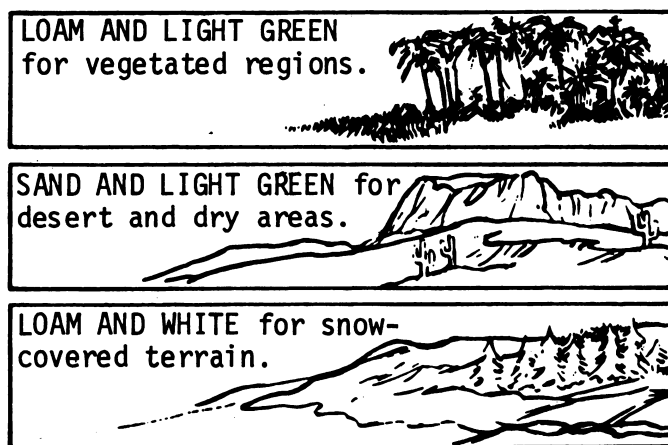


Figure 1

2. To camouflage exposed skin (fig. 2):

- a. Paint the shiny areas (forehead, cheekbones, nose, and chin) with a dark color.
- b. Paint the shadow areas (around the eyes, under the nose, and under the chin) with a light color.
- c. Paint the exposed skin on the back of your neck and hands with irregular patterns.
- d. When applying camouflage, use the buddy system--work with another man and check each other.



Figure 2

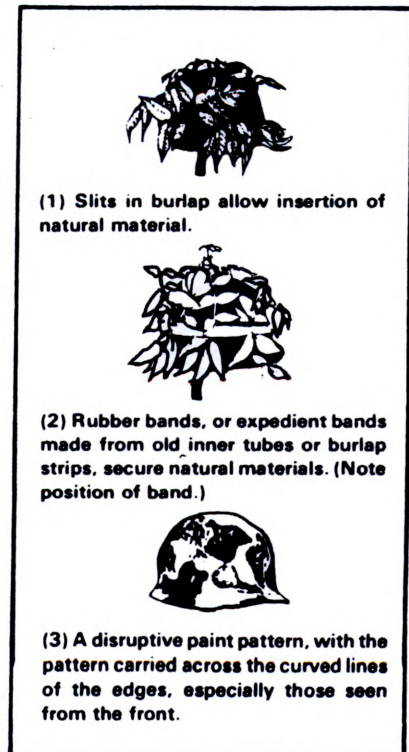


Figure 3

3. To camouflage the helmet (fig. 3):

- a. The outline of the helmet is one of the striking features of your equipment, and its curved shape can be easily identified by the enemy. You should attempt to break up the outline of your helmet. There are several ways of doing this. Figure 3 shows some examples.

b. Improvised helmet covers can be made of pieces of burlap, other cloth, or sandbags.

4. To camouflage your weapon (fig. 4):

a. One of the easiest ways to change the outline of your weapon is by wrapping it with burlap strips or strips of cloth dyed to match the background.

b. Pattern painting the weapon is also good. Shiny parts can be covered by cloth, paint, or mud.

c. Care must be taken when camouflaging a weapon not to cause interference in the sighting and firing of the weapon.

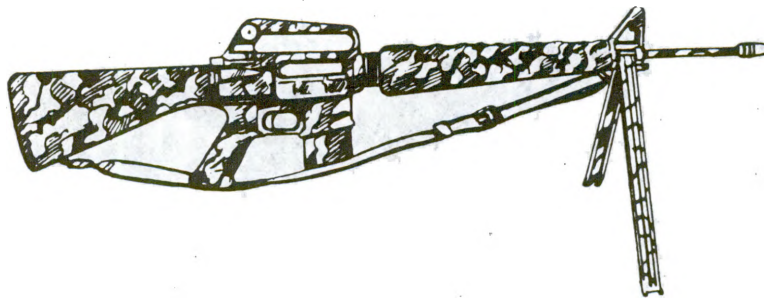


Figure 4

5. To camouflage your uniform:

a. Combat uniforms can be stained and dyed with a little imagination.

(1) You can make a uniform blend with the terrain by dyeing it or by attaching bow ties of colored burlap.

(2) A mixture of mud and grease or crankcase oil may be used to stain your uniform.

(3) When operating in snow-covered terrain, you can make a snowsuit from a sheet, mattress cover, or other white cloth.

b. The important thing is to make the clothing look less like a uniform and more like the terrain in which it is to be worn.

6. To blend with your surroundings (fig. 5): Blending is the use of camouflage materials on, over, and around an object so

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that it appears to be part of the background. For example, a soldier can apply stick paint to exposed skin, and add burlap, paint, and live vegetation to his helmet, clothing, and LBE so that he will closely resemble or blend into the background.

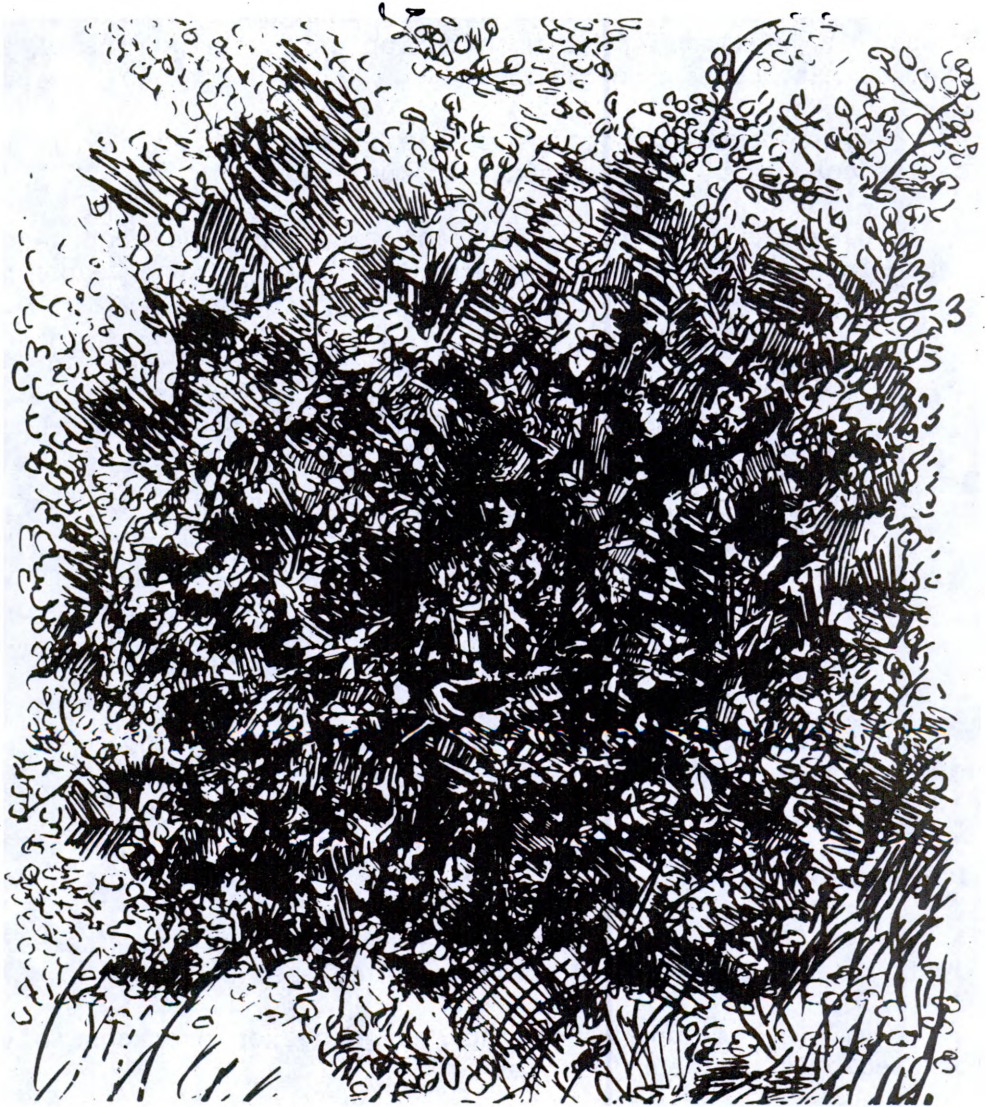


Figure 5

REFERENCES:

FM 5-20, Camouflage, May 68 (chap 4, pages 26 thru 30, para 11 thru 17)

TEC Lesson 937-061-0030-F, Cover, Camouflage, and Concealment, Part I

051-203-2509

CONSTRUCT A POINT DESIGNATION GRID

CONDITIONS:

You will be given aerial photographs, standard drafting equipment, a metric measuring scale, and pencils.

STANDARDS:

Construct a grid accurate to within .1 centimeter.

PERFORMANCE MEASURES:

1. Orient the photograph so that the marginal information is in the normal reading position. (See fig. 1.)

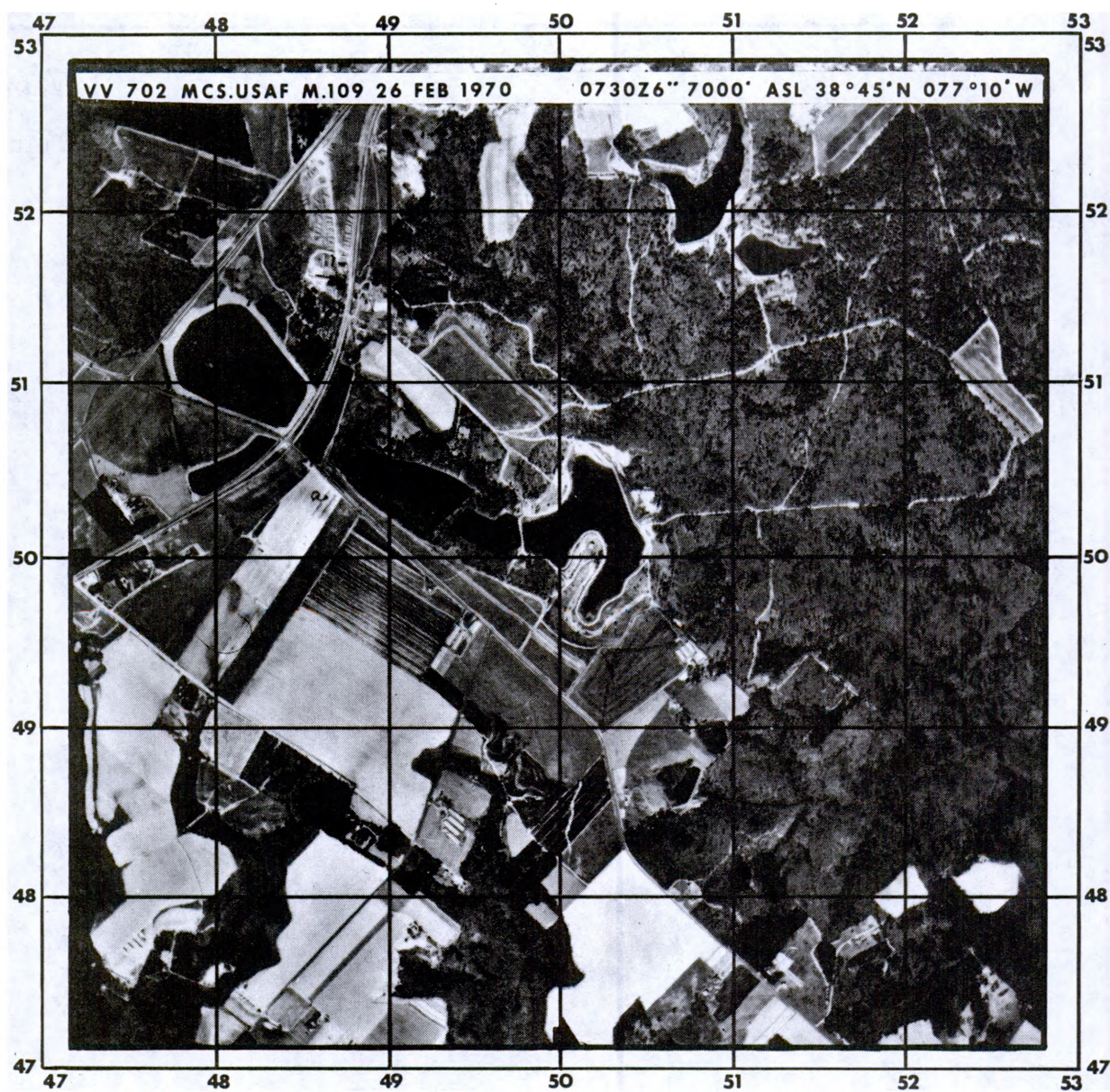


Figure 1

2-50

2. Using a straightedge, connect opposite fiducial marks (fig. 2).

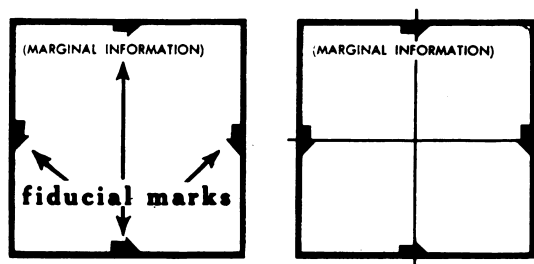


Figure 2

NOTE: If there are no fiducial marks on the photograph, determine the center of each side of the photograph and consider this to be the location of the fiducial marks.

3. Construct the vertical grid lines exactly 4 centimeters apart perpendicular to the horizontal centerline and parallel to the vertical centerline. Consider the vertical centerline to be a grid line and step off the measurements. Extend the grid beyond the margin of the photograph so that a grid line falls outside of the image area on either side of the photo (fig. 3).

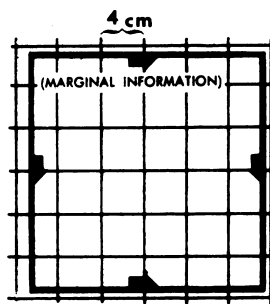


Figure 3

4. Construct the horizontal grid lines exactly 4 centimeters apart perpendicular to the vertical centerline and parallel to the horizontal centerline (fig. 4).

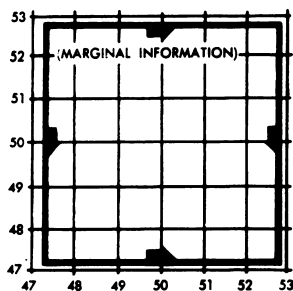


Figure 4

5. Label the point designation grid in the following manner (figs. 1 and 4).

a. Label the horizontal and vertical centerlines with the number 50.

b. Label the vertical grid lines so that they increase in value as you move to the right of the vertical centerline and decrease in value as you move to the left of the centerline.

c. Label the horizontal grid lines so that they increase in value as you move up from the horizontal centerline and decrease in value as you move down from the centerline.

REFERENCE:

FM 21-26, Map Reading, Jan 69 (chap 8, para 8-9)

051-203-2510

LOCATE A POINT ON AN AERIAL PHOTOGRAPH
USING POINT DESIGNATION GRID (PDG) COORDINATES

CONDITIONS:

You will be given aerial photographs containing a point designation grid, a coordinate scale, and PDG coordinates of a feature, position, or target.

STANDARDS:

Locate/plot the feature, position, or target on an aerial photograph within .05 centimeter of its true position.

PERFORMANCE MEASURES:

1. Identify the mission number and exposure number of the photograph on which the feature is located and select the correct photo based upon this information.

Example: PDG 702MCS-M109-63 487514

Mission Number: M-109

Exposure Number: 63

2. Orient the photograph so that the marginal information is in the normal reading position (fig. 1).

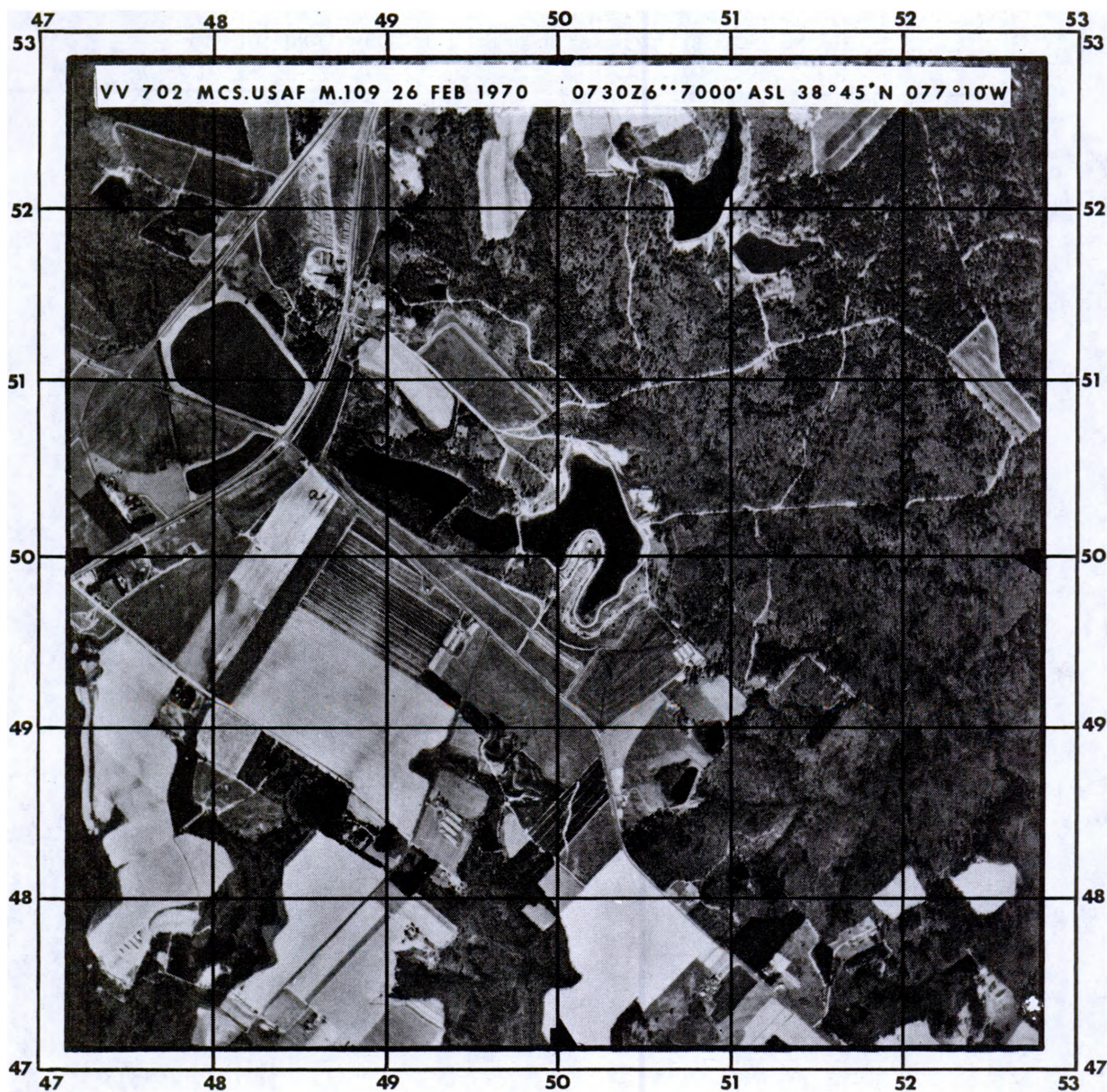


Figure 1

3. Locate the grid square in which the point is located. In the example given this would be grid square 4851.

NOTE: Read a PDG just as you would read a UTM (Universal Transverse Mercator) Grid--RIGHT and UP. A grid square is designated by the value of the intersecting lines in the lower left corner of the square.

4. Using the coordinate scale designated as 1/25,000 (fig. 2), plot the remaining portion of the coordinate.

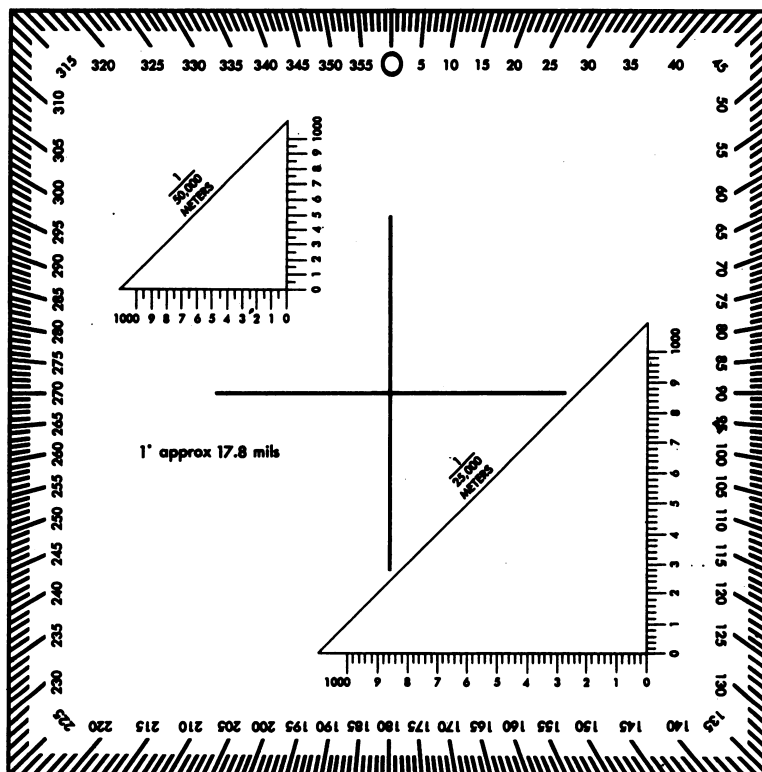


Figure 2

Example: 487514

NOTE: The point is plotted to the right of line 48, 7/10 of the distance between lines 48 and 49 and above line 51, 4/10 of the distance between lines 51 and 52 (fig. 3).

FM 31-11C-S

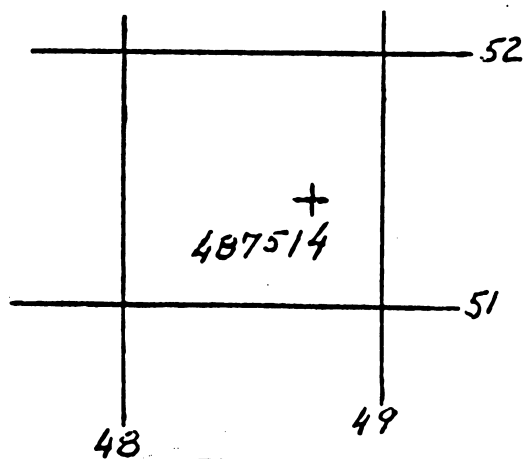


Figure 3

REFERENCE:

FM 21-26, Map Reading, Jan 69 (chap 8, para 8-9)

061-283-3031

DIRECT A CLOSE AIR SUPPORT (CAS) STRIKE

CONDITIONS:

You will be given binoculars, a map of the target area, the strike fighter call sign, mission number, ordnance load, target description, target location, enemy situation, friendly situation, any attack restrictions, fighter communication equipment, the radio frequency, and FM radio communication equipment. A CAS strike has been requested and is en route. A forward air controller (FAC) is not available in the battalion area.

STANDARDS:

1. Direct pilot(s) to the correct target.
2. Obtain desired effects on the target.

PERFORMANCE MEASURES:

1. Brief tactical air control party/forward air controller - air (TACP/FAC-A) on the following:
 - a. Target marking.
 - b. Air defense artillery (ADA) suppression.
 - c. Attack restrictions.
 - d. Friendly ADA considerations.
2. Mark target, if necessary (using artillery, mortar, tank fire, or smoke), 5-10 seconds before strike pilot approach to pullup point (PUP). The pullup point is where the pilot starts to climb or maneuver from a low-level approach to a sufficient height from which to attack. During this maneuver the pilot will identify the target.

3. Give pilot final adjustment from marking round (reference point) to target. This adjustment is given as a distance in meters and as cardinal direction from the marking round (reference point) to the target. Example: "From the base of the smoke your target is 300 meters northeast."

4. For follow-on aircraft, adjust from previous aircraft hits to target giving reference to cardinal headings. For example: From SLUF 1's bombs, "Shift southeast 200 meters."

5. Insure attack aircraft is lined up on proper target. If the pilot is not lined up on the proper target, abort the mission by contacting the pilot (through relay if necessary) and telling him to abort. Any words that communicate the abort directive are acceptable.

6. Give bomb damage assessment to FSE and Air Force point of contact.

REFERENCES:

FM 6-20, Fire Support in Combined Arms Operations, Sep 77 (app D)
TRADOC Training Text (TT) 6-20-7, Forward Air Controller/Fire Support Team (FAC/FIST) Operations
FM 6-30, The Field Artillery Observer, Aug 78

061-283-6001

LOCATE A TARGET BY GRID COORDINATES

CONDITIONS:

You will be given binoculars if available, a compass, a pencil, and a 1:50,000-scale military map of the target area. You have identified a target. Your position is plotted on your map.

STANDARDS:

Determine the grid coordinates of the target within 250 meters of the actual coordinates.

Locate the target within 90 seconds after identification.

PERFORMANCE MEASURES:

1. Orient the map to the ground by map-terrain association. (See task #071-329-1012, Orient a Map to the Ground by Map-Terrain Association.)
2. Locate the target on the map by comparing terrain features on the ground near the target with those shown on the map. (See task #071-329-1001, Identify Terrain Features (Natural and Manmade) on the Map.)
 - a. Hills and valleys.
 - b. Roads and trails.
 - c. Streams and other bodies of water.
 - d. Manmade objects.
3. Determine the six-digit grid coordinates of the target. (See task #071-329-1002, Determine the Grid Coordinates of a Point on a Military Map Using the Military Grid Reference System.)

FM 31-11C-S

REFERENCES:

FM 6-30, The Field Artillery Observer, Aug 78

TC 6-40-4, Fire For Effect, Mar 77 (part 1, pages 4 and 5)

TEC Lesson 949-061-0002-F, Target Location: Polar Plot, Grid Coordinates

061-283-6002

LOCATE A TARGET BY SHIFT FROM A KNOWN POINT

CONDITIONS:

You will be given binoculars (if available), a compass, a pencil, and a 1:50,000-scale military map of the target area. You have identified a suspected target near a point known by you to include direction and plotted in the fire direction center (FDC). Your own location is plotted on your map.

STANDARDS:

Locate the target within 250 meters of the actual location. Announce target location within 90 seconds after identification. Express direction to the nearest 10 mils and within 100 mils of actual direction. Express right or left corrections to the nearest 10 meters. Express range corrections to the nearest 100 meters.

PERFORMANCE MEASURES:

Definitions:

Deviation. The distance in mils or meters a target is right or left of a known point or the distance in mils or meters around bursts right or left of the target.

Lateral shift. The correction in meters the FO sends to the FDC to bring the mortar or artillery rounds onto the observer target (OT) line.

Range correction. The correction in meters the FO sends to the FDC to hit, bracket, or creep the mortar or artillery round onto the target for range.

OT factor. The known or estimated distance to a target or known point expressed in thousands (2,500 meters would be expressed as 2.5) and used to convert the mils between two points to meters (lateral shift).

1. Determine observer-target (OT) direction.

a. Measuring deviation from a known point to the target.

(1) By binoculars: In looking through binoculars you will find a mil scale which is used to measure horizontal distance (fig. 1). This scale is divided into 10-mil increments, with 100 mils across the scale. Let's say Hill 905 in figure 2 is your known point. You measure the deviation from Hill 905 to the target. The deviation is three 10-mil increments, or 30 mils right of Hill 905.

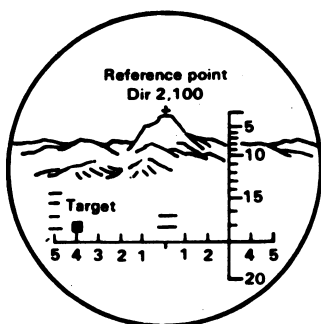


Figure 1

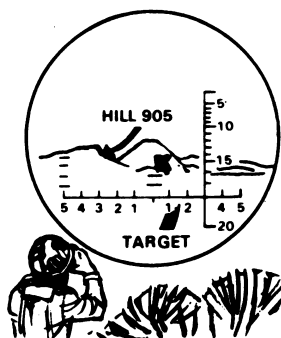


Figure 2

(2) By the hand-and-finger method:

(a) If you do not have binoculars, you can use your hand and fingers to measure how many mils right or left of the known point the target is. One finger is about 30 mils; two fingers, 70 mils; and three fingers, 100 mils. See figure 3 for approximate hand and finger values. To use this method, with your arm fully extended, count the number of fingers it takes to cover the distance from the known point to the target. Then again referring to figure 3 you have a good approximation of the deviation. Using the same known point, Hill 905, and the same target, let's use fingers to measure the deviation (see fig. 4). Extending the arm fully, you find the target one finger to the right of Hill 905. Recall that one finger is about 30 mils.

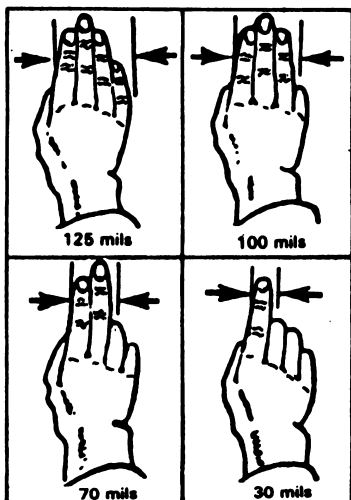


Figure 3

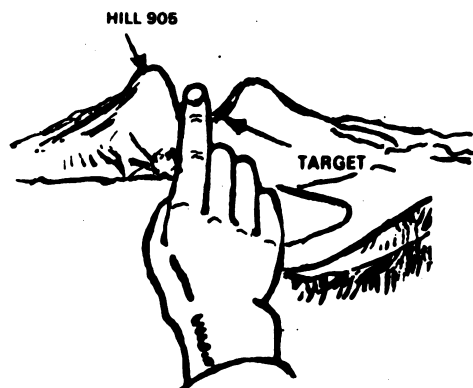


Figure 4

(b) If degrees are being used, remember: 17.8 mils equals 1°. As a general guideline, you can equate mils and degrees by using the relationship 35 mils equals 2°. The field artillery and mortars, however, would prefer measurement in mils. If it becomes necessary to use degrees, be sure you tell the FDC. Remember, your compass will measure mils as well as degrees.

b. Applying deviation. Apply the measured deviation to the known direction (if the target is right of the known point, add deviation; if the target is left of the known point, subtract the deviation).

NOTE: An easy way to remember this is the RALS rule: right-ADD-left-SUBTRACT.

(1) Right Deviations--Add. In figure 2, we know the direction to Hill 905 to be 3,200 mils. With the binoculars, we measure the deviation to be 30 mils. Since the target is right of the known point we add the deviation (30 mils) to the known direction (3,200 mils). The sum is the direction to the target (3,230 mils).

$$\begin{array}{r} 3200 \text{ (direction to known point)} \\ +30 \text{ (right deviation--add)} \\ \hline 3230 \text{ (direction to the target)} \end{array}$$

(2) Left Deviations--Subtract. In figure 1, we know the direction to the reference point (2,100 mils). With the binoculars, we measure the deviation to be 40 mils. Since the

target is left of the known point, we subtract the deviation (40 mils) from the known direction (2,100 mils). The answer (2,060 mils) is the direction to the target.

$$\begin{array}{r} 2100 \text{ (direction to known point)} \\ -40 \text{ (left deviation--subtract)} \\ \hline 2060 \text{ (direction to the target)} \end{array}$$

2. Determine the lateral shift from a known point to the target (see fig. 5) using the mil relation formula.

a. The formula is expressed as $\frac{W}{R\text{M}} = \text{M}$, where M is the angular measurement in mils between the two points, R is the distance in thousands of meters (expressed to the nearest 100) to the known points from which angle M was measured (fig. 5), and W is the lateral distance in meters.

b. A convenient way of using the mil relation formula is to cover the value desired and perform the calculation indicated. For example, to find the lateral shift in meters, the lateral distance (W) would be covered leaving the range (R) to be multiplied by the mils (M).

(1) For our purposes, the mil relation formula is used in conjunction with the distance to the known point expressed in thousands to the nearest 100 to determine lateral shift. The lateral shift in meters (W) is equal to the distance to the known point (R) times the angular deviation in mils (M).

(2) The distance to the known point is the distance from the observer to the known point (to the nearest 100 meters) divided by 1,000. For example, if the distance to the known point (church in fig. 5) is estimated to be 3,200 meters, the distance to the known point is 3.2.

$$\frac{3200}{1000} = 3.2$$

(3) Now we are ready to determine the lateral shift. We multiply the distance to the known point (3.2) by the angular deviation (30 mils); the product is the lateral shift (96 meters).

$$\begin{array}{r} 3.2 \text{ (R)} \\ \times 30 \text{ (M)} \\ \hline 96 \text{ (Lateral shift) } R \text{ } 100 \text{ (W)} \end{array}$$

Since the deviation is to the right, expressed to the nearest 10 meters, we shift Right 100.

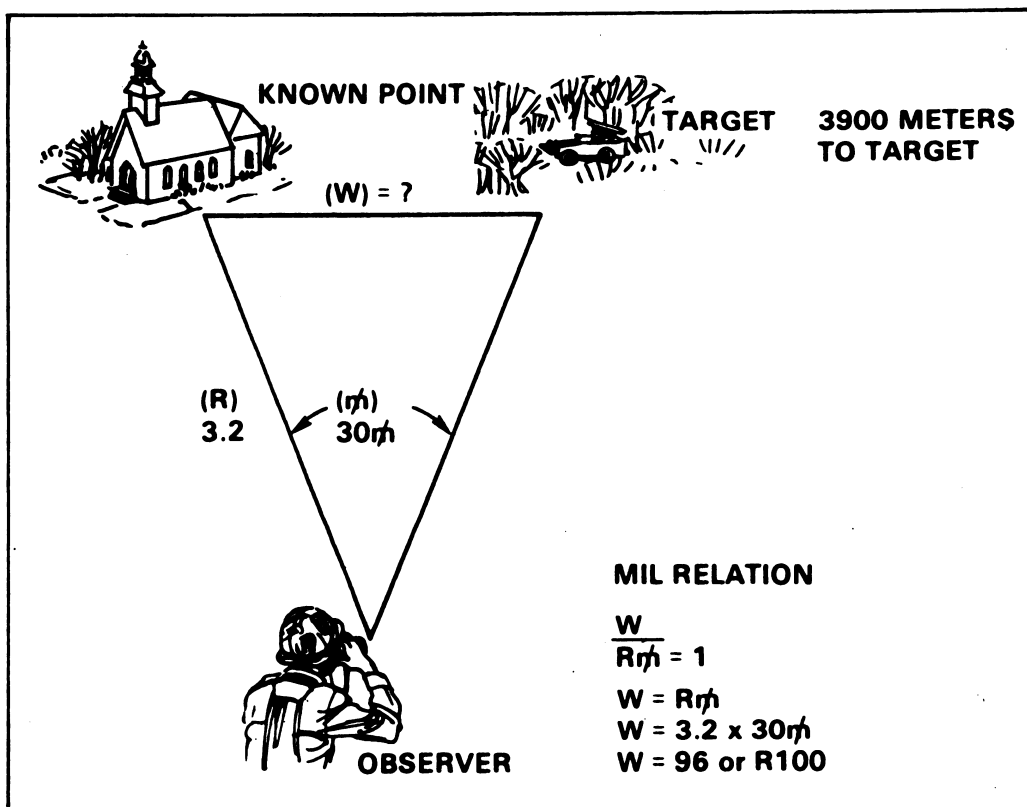


Figure 5

3. Determine range change from the known point to the target (see fig. 5).

a. The range change is estimated to the nearest 100 meters. If the target is beyond the known point, we add the range difference. If the target is closer than the known point, we drop the difference.

b. For example, if the distance to the known point is 3,200 meters and the estimated distance to the target is 3,900 meters, the range change is 700 meters (3900 - 3200 = 700). Since the target is beyond the known point, we add 700. If the target distance is estimated at 2,800 meters, the range change is 400 meters (3200 - 2800 = 400). Since the target is closer than the known point, we drop 400.

NOTE: Task 071-329-1010, Determine Azimuths, Using a Coordinate Scale and Protractor, must be mastered as a prerequisite to this task.

FM 31-11C-S

REFERENCES:

TC 6-40-4, Fire for Effect, Mar 77 (part 1, page 8, pages 10-17)

TEC Lesson 949-061-0001-F, Determination of Direction

TEC Lesson 949-061-0003-F, Locate a Target by Shift From a Known Point

FM 6-30, The Field Artillery Observer, Aug 78

061-283-6003

CALL FOR/ADJUST INDIRECT FIRE

CONDITIONS:

You will be given binoculars (if available), a radio, call signs for fire direction center (FDC), a compass, a coordinate scale, a pencil, and a 1:50,000-scale military map of the target area (targets may vary in range up to 4,000 meters).

STANDARDS:

The initial request for fire must be made within 3 minutes after the target has been designated. Adjustments must be transmitted within 30 seconds after round impacts. Observer must achieve effect on the target within five adjustments.

NOTE: Round must impact within 50 meters of the target to achieve effect on the target.

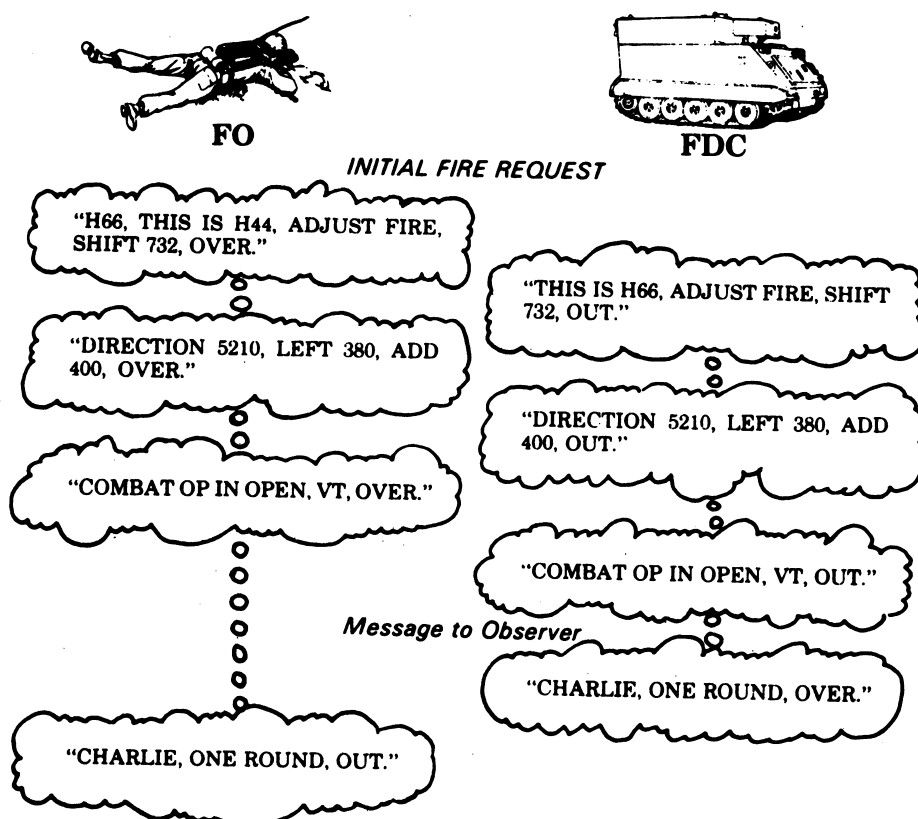
PERFORMANCE MEASURES:

1. Formulate and transmit the initial call for fire.
 - a. Locate the target by grid coordinate, shift from a known point, or polar plot.
 - b. Determine the direction from your position to the target.
 - c. Transmit the call for fire to the FDC on the FDC net. Include the following elements in sequence:
 - (1) Observer identification. (Your call sign.)
 - (2) Warning order. (Adjust fire.)
 - (3) Location of target. (Grid or shift data.)
 - (4) Description of target. (What is the target? Platoon in the open. . . .)
 - (5) Method of engagement (may be omitted if area fire is desired).

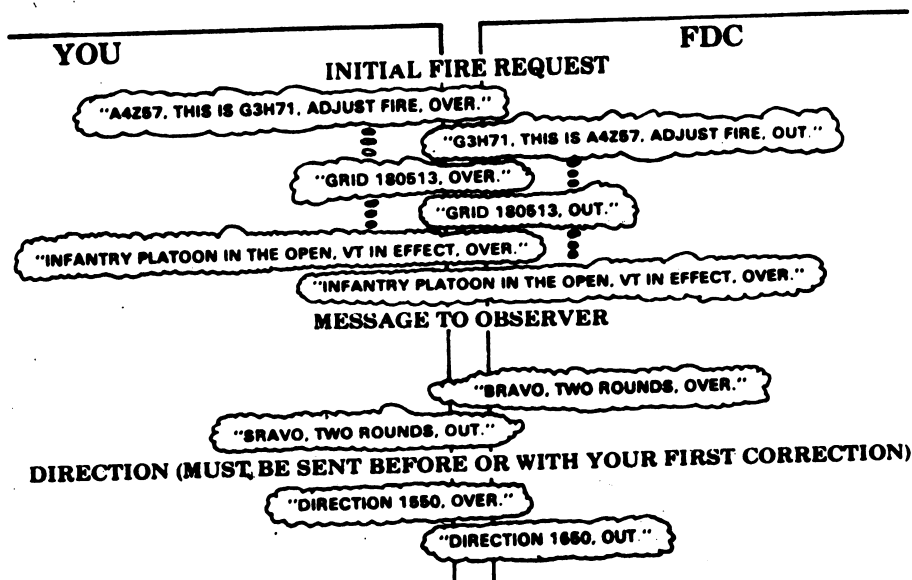
NOTE: If target is within 600 meters of friendly troops, announce "Danger close.")

(6) Method of fire and control.

The initial fire request for a mission using shift from a known point would be somewhat like example 1. The request for a grid mission would approximate example 2.



Example 1



Example 2

2. Adjust fire onto the target using the bracketing method of adjustment. (See fig. 1.)

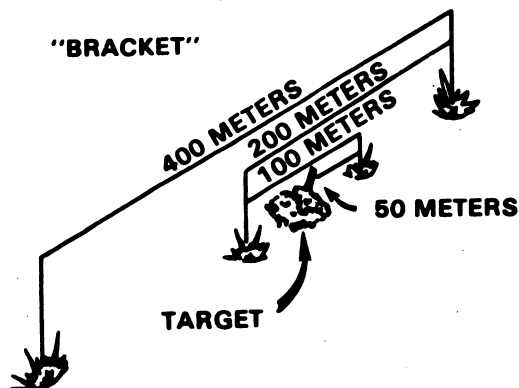


Figure 1

a. Spot each round when it impacts as over or short, right or left of your target.

(1) When the first range spotting is observed, make a range correction that would result in a range spotting in the

opposite direction; e.g., if the first round is short, add enough to get an over on the next round.

(2) Use the following guide to establish a bracket.

Round impact from target	Add or drop
Over 400 meters	+ or - 800 meters
200-400 meters	+ or - 400 meters
100-200 meters	+ or - 200 meters
less than 100 meters	- or - 100 meters

(3) Deviation.

(a) Measure the horizontal angle in mils, using either fingers or the reticle pattern in the binoculars (see figs. 2 and 3). Estimate the range to the target and divide by 1,000. This is the OT factor. If the OT distance is 1,000 meters or greater, the OT factor is expressed to the nearest whole number. If the OT distance is less than 1,000 meters, the OT factor is expressed to nearest 1/10th; e.g., 800 = .8. Multiplying the OT factor by the deviation measured in mils produces deviation in meters.

(b) For example, in figure 2 we measure the round 100 mils right of the target. Estimating the range to be 2,200 meters, the OT factor is 2.2. For adjustment purposes, we express the OT factor to the nearest whole number. Example: 1.1 would be 1; 1.8 would be 2; 2.5 would be 3. Multiplying the angle (100 mils) by the OT factor (2), we get the deviation in meters (200 meters right).

100 (deviation in mils)
2 (OT factor)
<hr/> 200

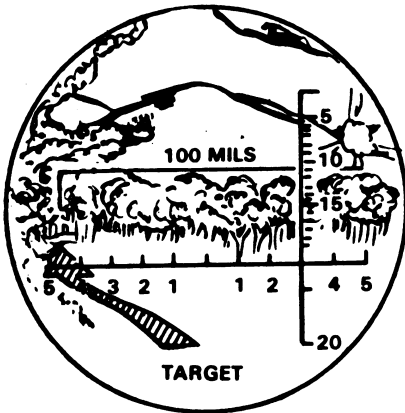


Figure 2

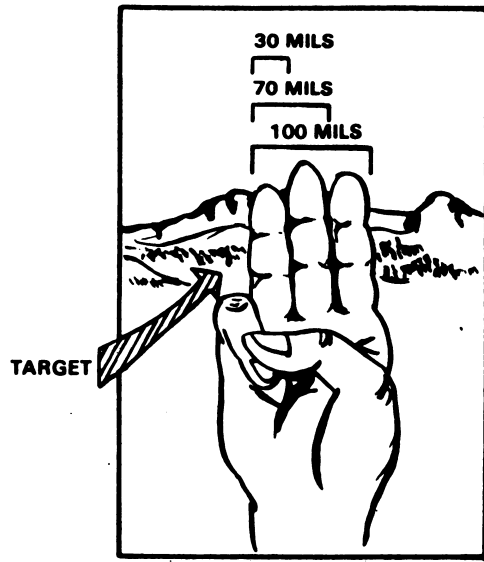
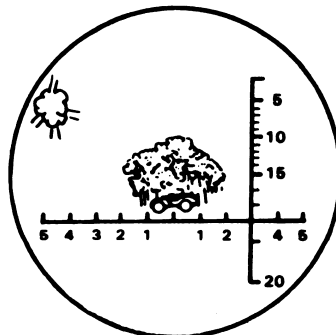


Figure 3

b. Transmit corrections to the FDC in meters. The initial correction should bracket the target in range. Deviation corrections should be made to keep the rounds on line. Figure 4 shows the impact of your initial round. Since the round is beyond the target, you must drop. You estimate that the round is 250 meters beyond the target. Therefore, a 400-meter drop will give you a bracket.

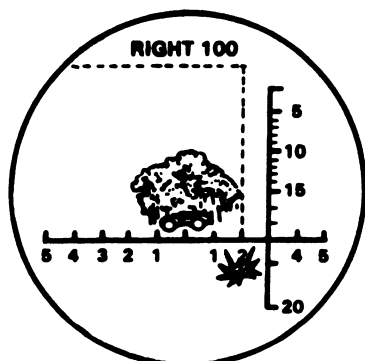
The round impacted 50 mils left of the target. With an OT factor of 2, the round impacted 100 meters left. Your correction to FDC is "Right 100, Drop 400, Over."



(MILS) X (OT) = (SHIFT)
 50 x 2 = 100 METERS
 "RIGHT 100, DROP 400, OVER"

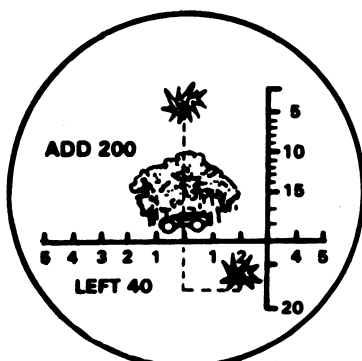
Figure 4

c. Continue splitting the range bracket until a 100-meter bracket is split or a range correct sensing is observed, maintaining deviation on line. Figures 5, 6, and 7 show the next three adjustments. Note that each deviation correction is made to keep the impacting rounds on line. The range corrections split the bracket each time. The adjustment phase of a fire mission would resemble example 3.



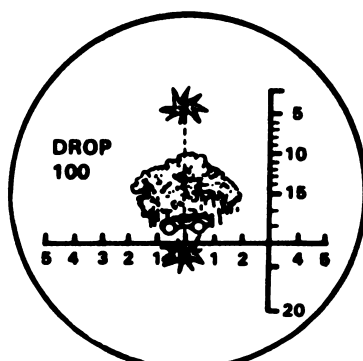
"LEFT 40, ADD 200, OVER"

Figure 5



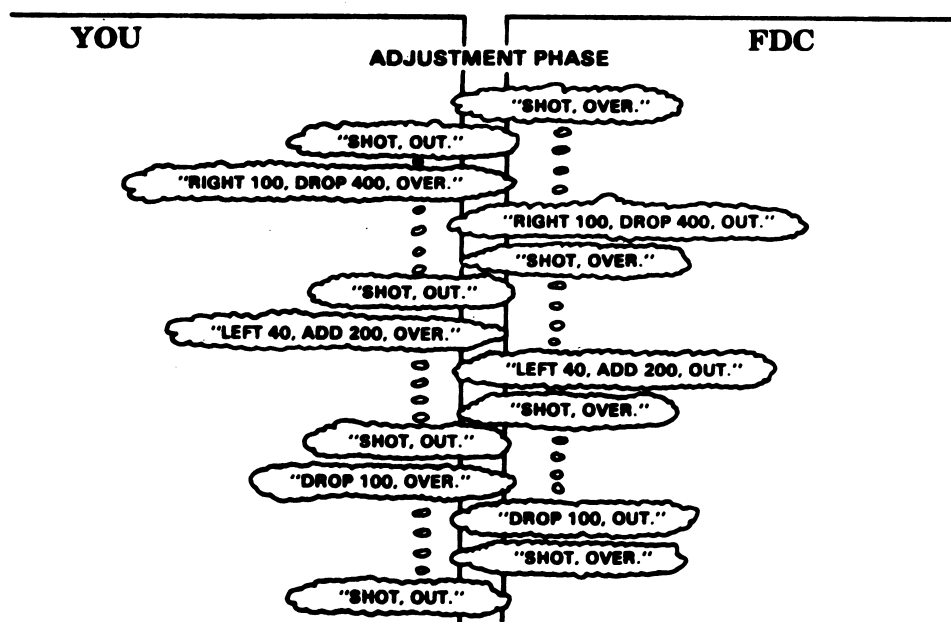
"DROP 100, OVER"

Figure 6



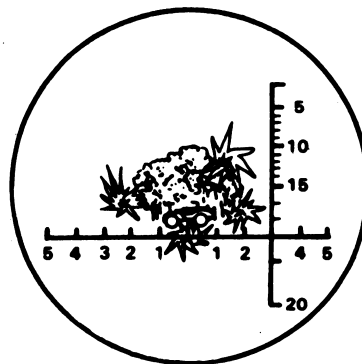
"ADD 50, FIRE FOR EFFECT, OVER"

Figure 7



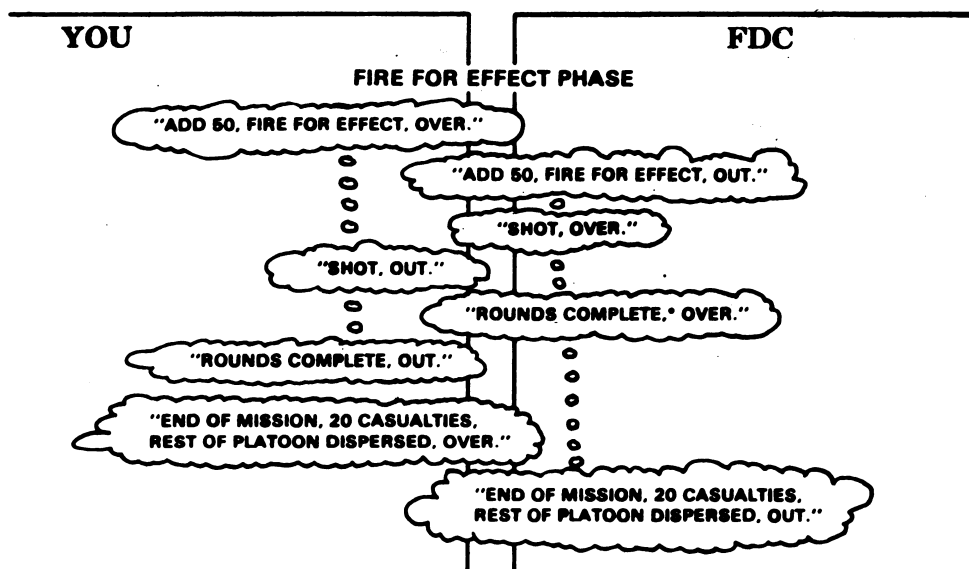
Example 3

d. Initiate fire for effect. When a 100-meter bracket is split or a range correct spotting is made, the fire-for-effect phase is entered. Note that figure 7 shows the 100-meter bracket split and the call is fire for effect. Figure 8 shows a simulated pattern which might be observed in the fire-for-effect phase. (See example 4.)



"END OF MISSION"

Figure 8



*ROUNDS COMPLETE MEANS ALL ROUNDS TO BE EXPENDED IN FIRE FOR EFFECT HAVE BEEN FIRED.

Example 4

3. Observe the results of fire for effect and report the results. When the smoke clears, tell the FDC what the results are. Such things as the number of casualties, damaged equipment, stalled tracks, etc., are important. (See example 4.)

4. In the event that fire is required within 600 meters of friendly troops, the following guidelines apply.

a. Announce "Danger close" to the FDC in the initial call for fire.

b. Initial target location is reported on the enemy side of the target.

c. Creeping procedures are used to adjust danger-close fire.

(1) Range corrections should not exceed 100 meters.

(2) Never bracket; it could cause friendly casualties.

NOTE: In a hostile environment, authentication may be required before fire is delivered.
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REFERENCES:

TC 6-40-4, Fire for Effect, Mar 77 (part 1, pages 2-8, 10-17; part 2, pages 20-6; part 3, pages 28-34; part 4, pages 36-40)

TEC Lesson 949-061-0001-F, Determination of Direction

TEC Lesson 949-061-0002-F, Target Location: Polar Plot and Grid Coordinates

TEC Lesson 949-061-0003-F, Locate a Target by Shift From a Known Point

TEC Lesson 949-061-0005-F, Adjustment of Indirect Fire by the Bracketing and Creeping Methods, Part I

TEC Lesson 949-061-0006-F, Adjustment of Indirect Fire by the Bracketing and Creeping Methods, Part II

FM 6-30, The Field Artillery Observer, Aug 78

061-283-6004

LOCATE A TARGET BY POLAR PLOT

CONDITIONS:

You will be given binoculars (if available), a compass, a protractor, a coordinate scale, a pencil, and a 1:50,000-scale military map of the target area. You have identified a target. Your position is plotted on your map and is known by the fire direction center (FDC).

STANDARDS:

Locate the target within 250 meters of the actual location. Announce target location within 90 seconds after identification. Express direction to the nearest 10 mils and within 100 mils of the actual direction. Express distance to the nearest 100 meters.

PERFORMANCE MEASURES:

1. Determine Direction to the Target. Direction is the clockwise angle measured from grid north to the target. Direction may be determined using a compass, computed by adding or subtracting from a known direction (see task #061-283-6002, Locate a Target by Shift From a Known Point), determined by using a map and protractor (see task #071-329-1010, Determine Azimuths Using a Coordinate Scale and Protractor), or estimated.

2. Estimate Distance to the Target. Distance can be estimated by the "football field" method. A football field is 100 yards long, and 100 yards is about 100 meters. A target that is about 24 football fields away from you is at a distance of about 2,400 meters. Another way of estimating distance is the flash-to-bang method. After seeing a flash or burst in the target area, you count the number of seconds until you hear the sound. Then multiply the number of seconds times 350 (350 meters per second is the approximate speed of sound) to obtain the distance; i.e., 5 seconds \times 350 = 1,750 meters, which is expressed as 1,800 meters.

FM 31-11C-S

REFERENCES:

TC 6-40-4, Fire for Effect, Mar 77 (part 1, pages 6, 7, 10-17)

TEC Lesson 949-061-0002-F, Target Location: Polar Plot and Grid Coordinates

FM 6-30, The Field Artillery Observer, Aug 78

071-325-4406

INSTALL/RECOVER A MECHANICAL AMBUSH

CONDITIONS:

Given a bandoleer containing an M18A1 (Claymore) antipersonnel mine (practice) complete with accessories, a roll of tripwire, a plastic spoon or some other nonconductor of electricity, a power source (battery with at least 3 volts), a clothespin, and a knife.

STANDARDS:

1. Within 15 minutes, lay and aim the Claymore IAW performance measures 1 through 5 below.
2. Within 10 minutes, recover the mechanical ambush IAW performance measure 6 below.

PERFORMANCE MEASURES:

1. Laying and Aiming.
 - a. Laying.
 - (1) Check to see that the mine and all accessories are in the bandoleer.
 - (2) Remove the electrical firing wire, leaving the mine and other accessories in the bandoleer.
 - (3) Secure the shorting plug end at the firing position. Place the bandoleer on your shoulder and unroll firing wire to the position selected for emplacing the mine.
 - (4) Remove the mine from the bandoleer and position it with the surface marked "FRONT TOWARD ENEMY" and the arrows on top of the mine pointing in the direction of the enemy or the desired area of fire.
 - b. Aiming (fig. 1). Select an aiming point at ground level that is about 50 meters in front of the mine. Aim the mine by alining the two edges of the sight with the aiming point (fig. 1).

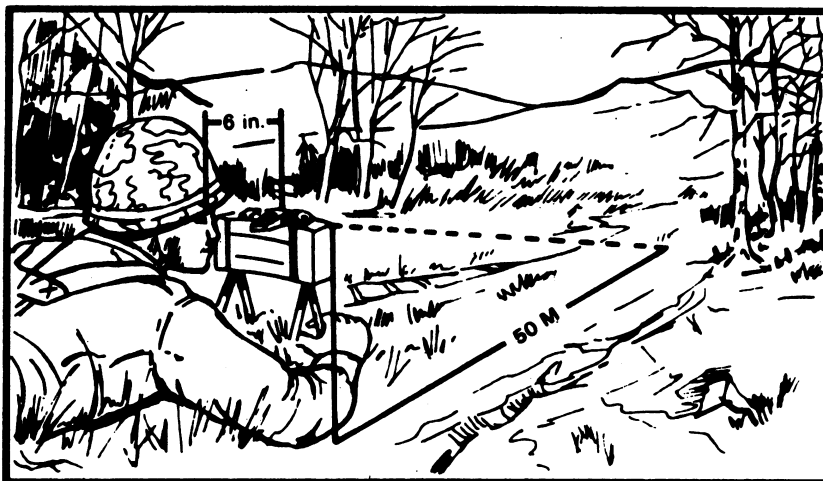


Figure 1

2. Preparation of Firing Wire. Unroll the full length of the firing wire, keeping the blasting cap inside the plastic spoon. Cut the combination shorting plug and dust covers from the end of the firing wire and remove about 2.54 centimeters (1 inch) of insulation from each of the cut wires. Twist the ends of the wires together to prevent static electricity from entering the firing wire and detonating the blasting cap. These wires will later be connected to the power source.

3. Installation of Firing Devices.

a. Prepare wire as shown in figure 2.

b. Prepare clothespin as shown in figure 2.

c. Form a loop in each end of the bare wires and fit one loop over the lower jaw and one loop over the upper jaw of the clothespin. Insure that the wires are seated in the cutaway grooves on the clothespin, then twist the wires until they are tight and secure to the jaws of the clothespin.

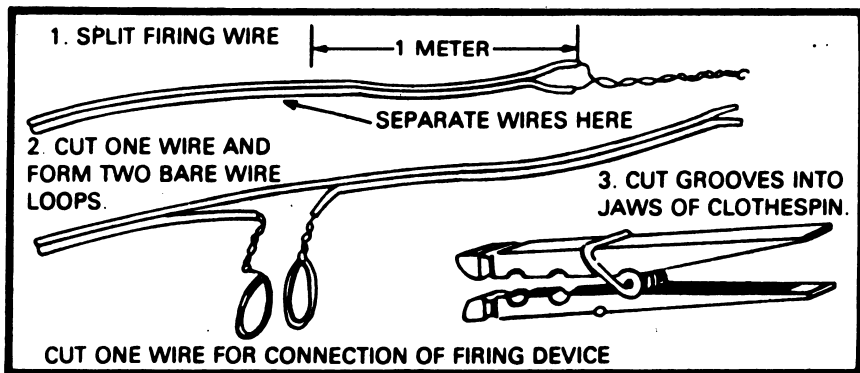


Figure 2

4. Connecting the Tripwire. The tripwire will be attached to a C-ration plastic spoon (or some other nonconductor of electricity). Connect other end of the tripwire to a tree, stake, etc. (fig. 3). Insert the spoon between the jaws of the clothespin. The clothespin will be firmly attached to a tree or stake on the opposite side of target area (fig. 3). The tripwire should be placed about ankle-high to prevent easy detection by the enemy.

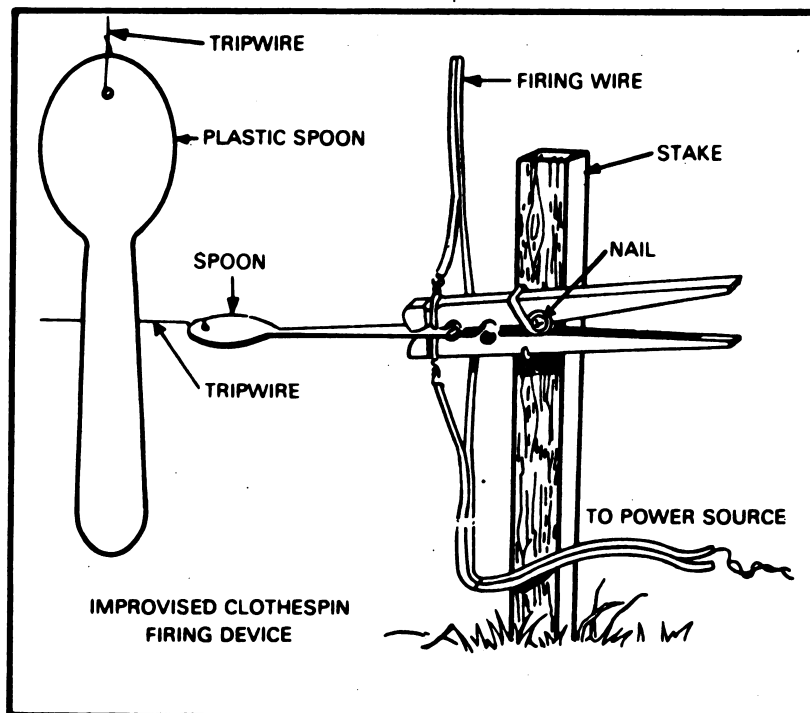


Figure 3

5. Arming and Electrical Firing.

a. Secure the firing wire about 1 meter behind the mine so it will not become mislaid should the firing wire be disturbed. Insert blasting cap into either detonator well and lock with shipping plug priming adapter.

b. Connect power source.

CAUTION: Insure handle of spoon is fully and securely seated in the jaws of the clothespin. Insure that tripwire is not too tight and area is clear of any objects that might fall on the tripwire and cause a premature detonation of the mine. Separate the twisted ends of the firing wire and attach them to the power source. The power source must produce a minimum of 3 volts of electricity.

NOTE: Installation should not be attempted during inclement weather (training only).

An example of a mechanical ambush is shown in figure 4.

6. Recovery of Mechanical Ambush. Reverse the steps used to install a mechanical ambush.

a. Disconnect firing wire from power source.

b. Remove blasting cap from the Claymore and place the Claymore in bandoleer.

c. Roll up firing wire and recover other items, power source, tripwire, and firing device.

d. Place all equipment in bandoleer.

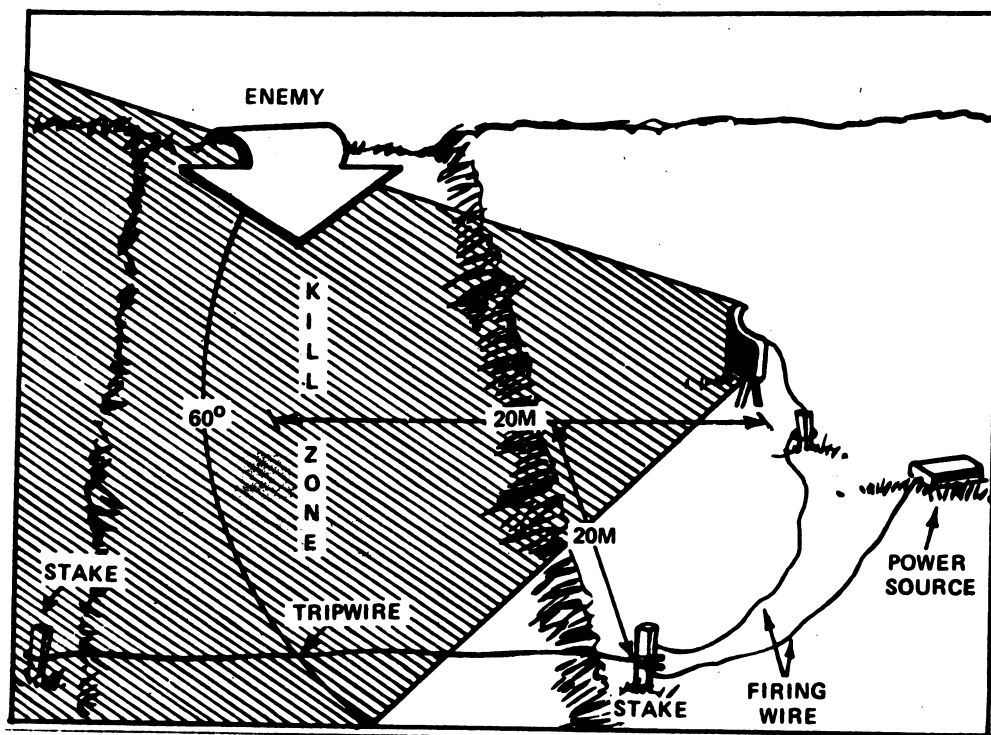


Figure 4

REFERENCE:

FM 23-23, Antipersonnel Mine M18A1 and M18 (Claymore), Jan 66, C1 and 2.

FM 31-11C-S

071-326-0607

USE HAND AND ARM SIGNALS TO DIRECT LANDING OF A HELICOPTER

CONDITIONS:

You will be on a marked landing zone. An airborne helicopter will be approaching.

This task will be performed during daylight or darkness. If performed during darkness, you will be given lighted batons or flashlights.

STANDARDS:

Direct helicopter into a given area using proper hand and arm signals so that the helicopter lands safely at the designated point.

PERFORMANCE MEASURES:

1. Signal must be given in a clear, distinct manner. Signal should be given only when needed.

2. At night, signals are given using lighted batons or flashlights in each hand. Signals given at night are identical to those given in daylight. When using flashlights, take care not to blind the pilot. Batons and/or flashlights should remain lighted at ALL TIMES when signaling.

3. Speed of arm movement indicates desired speed of aircraft in response to signal.

4. Landing helicopter:

a. Stand to the right front of the aircraft where the pilot can see you (fig. 1).

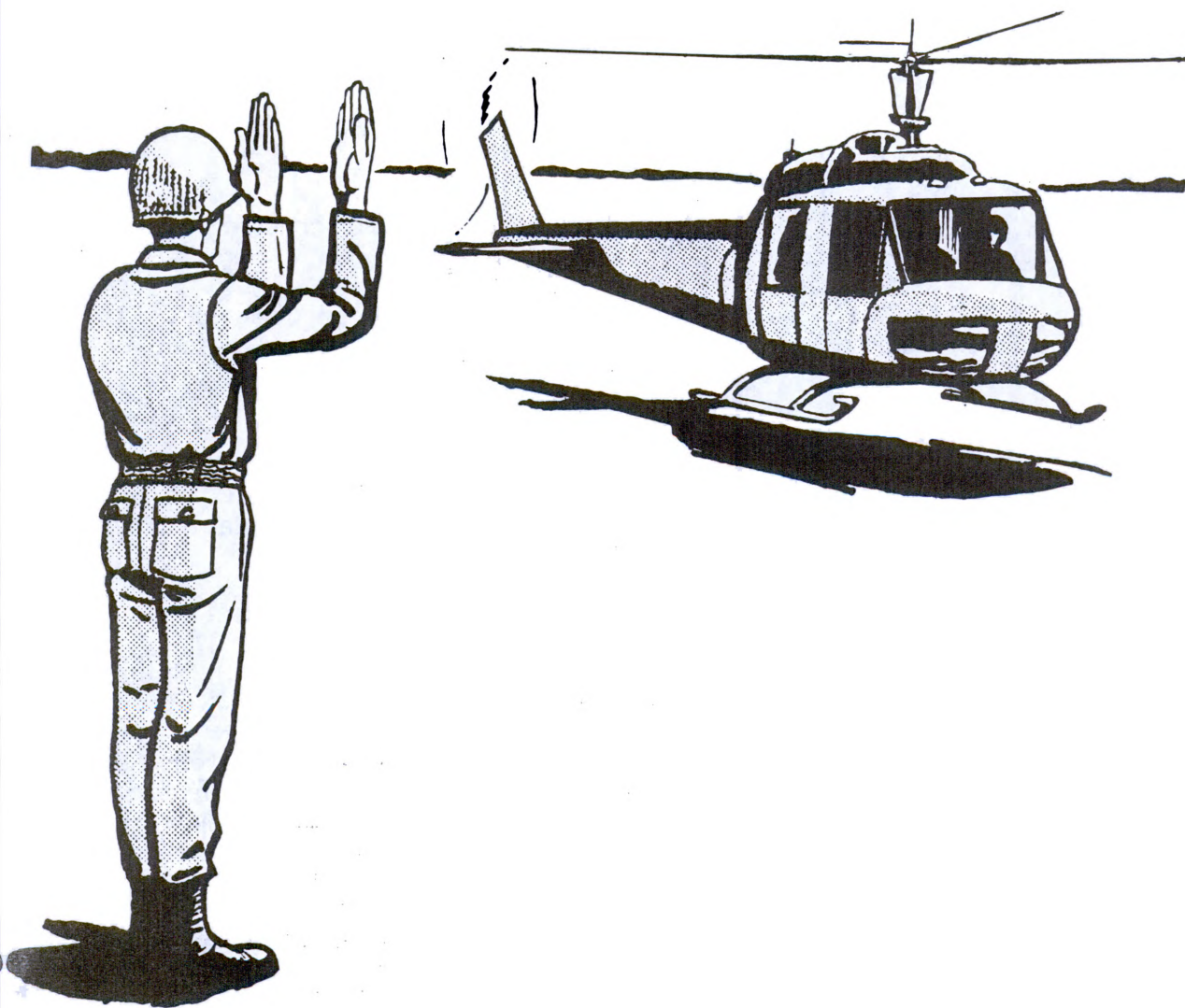


Figure 1. Standing position in directing landing of helicopter.

b. To assume guidance, raise arms above the head in a vertical position with palms facing inward (fig. 2).



Figure 2. Assume guidance.

c. To indicate hover, extend arms sideways, horizontally, with palms downward (fig. 3).

NOTE: When guiding a landing helicopter, this signal normally should not be given until the helicopter is approximately 5 feet off the ground and just short of the desired landing point, depending on its forward speed.

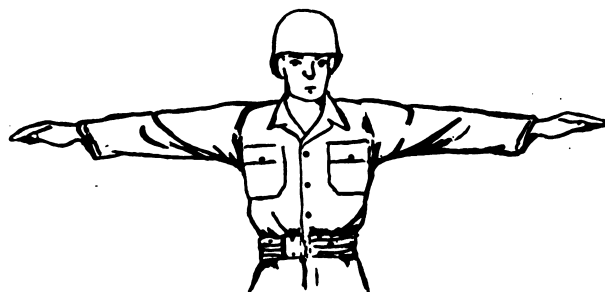


Figure 3. Hover.

d. To indicate move ahead, have arms a little aside, palms facing backwards; repeatedly move upwards and backwards from shoulder height (fig. 4).



Figure 4. Move ahead.

e. To indicate move back, have arms by sides, palms facing forward; sweep arms forward and upward repeatedly to shoulder height (fig. 5).

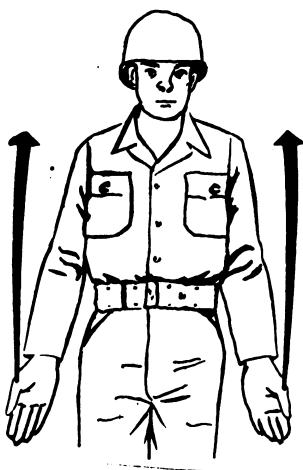


Figure 5. Move back.

f. To indicate move upwards, extend arms sideways, horizontally, with palms upward, beckoning upwards by moving arms to above the head (fig. 6).

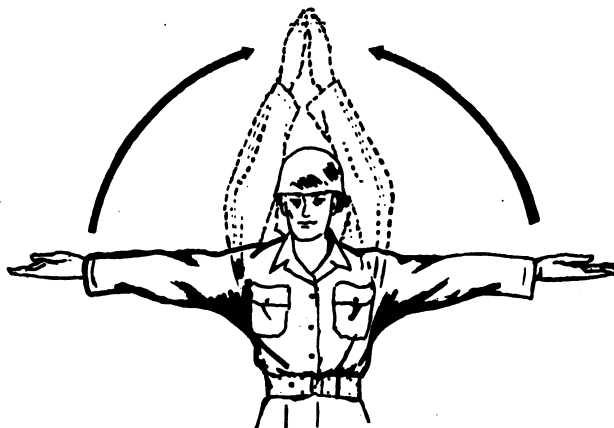


Figure 6. Move upwards.

g. To indicate downwards, extend arms sideways, horizontally, with palms turned down, beckoning downwards by moving arms down to sides of body (fig. 7).

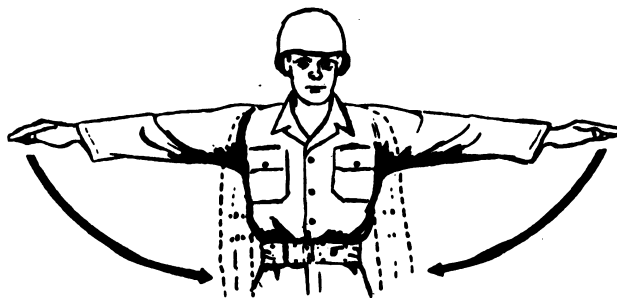


Figure 7. Move downwards.

h. To indicate move right, extend left arm sideways, horizontally, in direction of movement and repeatedly swing right arm in front of body in the same direction (fig. 8).

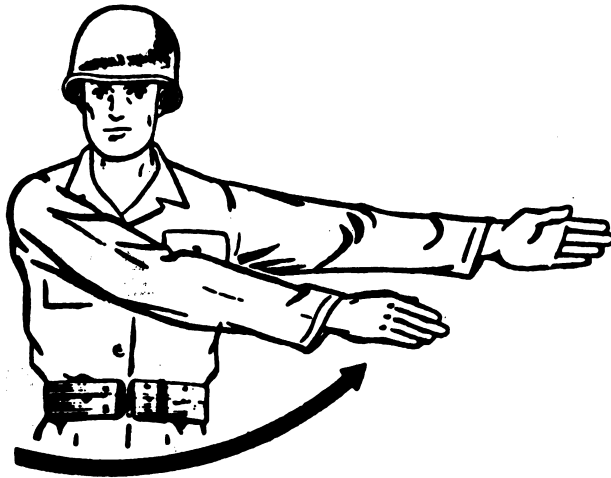


Figure 8. Move right.

i. To indicate move left, extend right arm sideways, horizontally, in direction of movement and repeatedly swing left arm in front of body in the same direction (fig. 9).

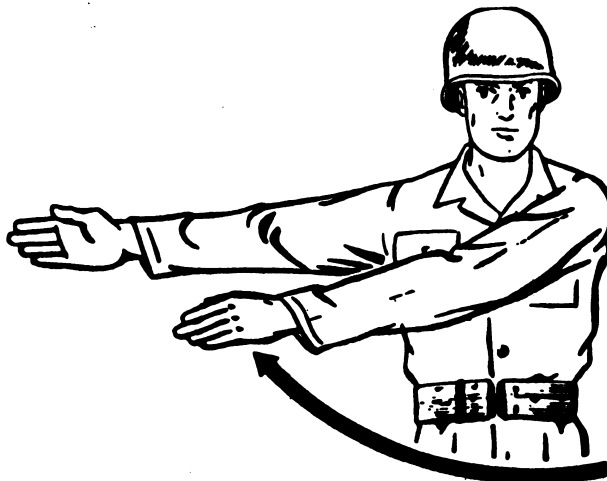


Figure 9. Move left.

j. To indicate cut sling load, extend left arm horizontally with fist toward the load while the right arm, with palm down, makes a horizontal slicing motion under the left arm (fig. 10).



Figure 10. Cut sling load.

k. To indicate a spot turn, move left or right hand upward and backward from a horizontal position to indicate direction of tail movement; other hand pointing to center of spot turn (fig. 11). You must stay in full view of the pilot.

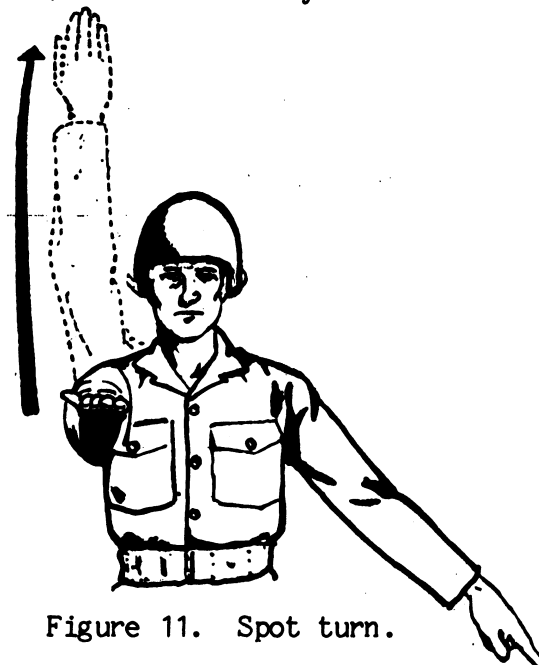


Figure 11. Spot turn.

1. To indicate land, extend arms downward and cross in front of body (fig. 12).



Figure 12. Land.

- m. To indicate stop, cross arms repeatedly above the head (fig. 13).



Figure 13. Stop.

n. To indicate takeoff, extend right hand overhead, make circular movement, then using a throwing motion, extend arm in the direction of takeoff (fig. 14).

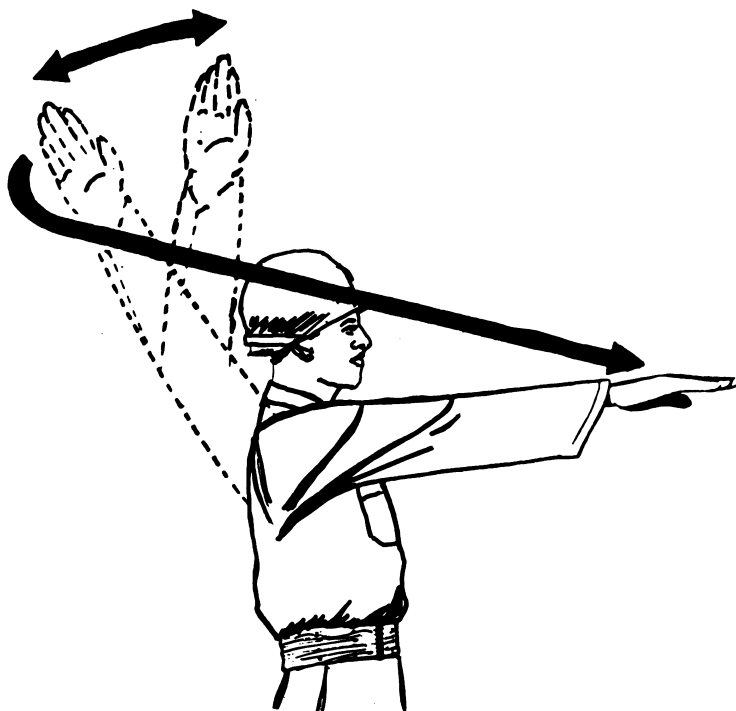


Figure 14. Takeoff.

REFERENCE:

FM 57-38, Pathfinder Operations, Oct 68, C1 and 2 (app F).

071-326-1000

CONSTRUCT A PONCHO RAFT
(BRUSH OR AUSTRALIAN)

CONDITIONS:

Given a minimum of one other soldier, both of you have individual equipment including at least two ponchos, two rucksacks/packs, LBE, individual weapons, and a requirement to cross a water obstacle with little or no current.

- | | |
|--------|---|
| NOTES: | 1. Construction of the brush raft requires the following additional material: a machete or some cutting tool, brush, two small saplings, and a rope for towing. |
| | 2. Construction of the Australian raft requires the following additional material: two 4-foot poles for bulk and a rope for towing. |

STANDARDS:

1. The poncho raft constructed supports the weight of the equipment within it.
2. Transports equipment across the water obstacle safely.

PERFORMANCE MEASURES:

1. In crossing rivers and streams, it is unlikely that you will have engineer support to assist your river and stream crossings. You must, therefore, know how to cross water obstacles with minimum materials.

2. There are several expedient ways to cross water obstacles. The one most often used is the poncho raft, since all soldiers carry or have available to them the material to construct such a raft.

a. Poncho brush raft:

(1) With the help of a buddy, take two ponchos and tie the neck of each tightly by using the drawstring.

(2) Spread one of the ponchos on the ground with the tied-off hood up so that it will end up on the inside of the raft.

(3) Cut fresh, green brush (no thick branches) and pile it on the poncho about knee-high (18 inches).

(4) Make an X-frame of small saplings on the pile of brush. Anchor this X-frame by tying the drawstring of the poncho up through the brush and around the center of the X-frame.

(5) At this point, pile another 18 inches of brush on top of the X-frame.

(6) With the help of your buddy, compress the brush slightly and fold the poncho up around the brush. Using ropes or vines, tie diagonally across from corner grommet to corner grommet and straight across using side grommets. The sides of the poncho will not be pulled together during this tying procedure.

(7) Now, spread the second poncho on the ground with the tied-off hood up, next to the bundle made of the first poncho and brush. Roll the bundle over onto the center of the spread poncho so that the tied side is down. Tie off the second poncho in the same manner around the bundle as the first poncho.

(8) This raft will safely float 250 pounds and is very stable.

(9) An empty canteen tied to one end of a rope, with the other end tied to the raft, will assist in towing.

b. Australian poncho raft:

(1) When there is not enough time to gather a lot of brush, you can make a raft using only your individual equipment and two 4-foot poles for bulk. It is more waterproof than the poncho brush raft but will float only about 80 pounds of weight.

(2) With the help of a buddy, take two ponchos and tie the neck of each tightly by using the drawstring.

(3) Place one poncho on the ground with the hood facing up.

(4) Place the two 4-foot poles (or branches) in the center of the poncho about 18 inches apart.

(5) Place the rucksacks, packs, and/or other equipment desired between the poles.

NOTE: To keep individual clothing dry, you should place outer garments and boots on the poncho at this point.

(6) With the help of your buddy, snap the poncho sides together, hold the snapped portion of the poncho in the air, and roll it tightly down toward the equipment. Make sure the full width of the poncho is rolled.

(7) At this time, each of you take one end of the roll and twist the roll to form pigtails. Bend these back over the bundle and tie them securely in place using bootlaces, vines, ropes, or other available material.

(8) Now, spread the second poncho on the ground with the tied-off hood up (if you have time or need more bouyancy, you could at this time place some fresh, green brush between this poncho and the first one).

(9) Place the equipment bundle formed with the first poncho, with the pigtails facing down, on the second poncho.

(10) Snap and roll the second poncho in the same manner as the first poncho, then twist and tie the pigtails. For added security, bind the raft about 1 foot from each end.

(11) Place your weapons on top of the raft and secure them to the raft.

(12) Again, an empty canteen tied to one end of a rope, with the other end tied to the raft, helps in towing. The raft is now ready for the water.

3. When launching any poncho raft, or leaving the water with it, take care not to drag it on the ground as this might cause punctures or tears.

REFERENCE:

FM 31-35, Jungle Operations, Sep 69

CONSTRUCT A ONE-ROPE BRIDGE

CONDITIONS:

In a field training environment you will be given the following equipment per person/piece of equipment to be moved across the obstacle (stream, small river, gorge, etc.).

- a. Two snaplinks per piece of heavy equipment.
- b. Two snaplinks per double butterfly.
- c. One snaplink per lifeguard bundle.
- d. One snaplink per person.
- e. One utility rope per person.
- f. One 10-foot utility rope per piece of heavy equipment.
- g. Sufficient length of 1/4-inch rope.
- h. One snaplink per lifeguard rucksack.
- i. One waterproof bag and B7 life preserver.

STANDARDS:

1. The rope bridge must support a soldier's weight and equipment from the close bank to the far bank (approximately 300 pounds).
2. At the anchor points, rope must be tied off using double butterfly knots.
3. Utility rope must be tied to each individual's waist using a bowline knot. The bowline knot will also be used for the snaplink hookup.

PERFORMANCE MEASURES:

1. Task will be performed by as many as five soldiers in the following manner:

a. Actions of number one man (near shore lifeguard).

(1) Removes clothing.

(2) Secures clothing and equipment in a single bundle using utility rope.

(3) Bundle is placed in a secure position on the bank near the lifeguard's position.

(4) He ties an end of the rope bowline in a utility rope and places it on his arm. He ties an overhead knot in the running end for a lifesaving aid.

(5) He puts on a B7 life preserver.

(6) He enters water and assumes his lifesaving position downstream.

(7) No other patrol member enters the water prior to the near shore lifeguard.

b. Actions of the number two man (far shore lifeguard).

(1) Removes clothing as was done by the near shore lifeguard.

(2) Places bundle at the near shore anchor point.

(3) He ties his utility rope around his waist using a round turn and a square knot with the half hitches.

c. When these actions have been completed and the ropes are properly prepared and inspected, the following occurs:

(1) The number two man enters the water with the loop of the 1/4-inch rope attached to the utility rope around his waist by means of a snaplink.

(2) The number two man then moves upstream paralleling the bank to compensate for current, while the number three man carefully feeds out the 1/4-inch rope.

(3) The number two man swims to the far shore anchor point.

(4) The number two man climbs the bank, moves to and behind the far shore anchor point.

(5) The number two man pulls the remainder of the 1/4-inch rope and approximately 8-10 feet of the 1/2-inch rope across.

(6) The number two man temporarily secures the ropes while the number three man and number four man pull the slack out of the rope.

(7) The number four man holds the rope taut while the number three man ties a double butterfly and completes the transport tightening system.

(8) The number two man then pulls the double butterfly away from the near shore anchor point (9-10 feet if manila rope is used and one-third the distance across the river if nylon rope is used) and ties off the 1/2-inch rope with a round turn and two half hitches with a quick release.

(9) The number three man with the aid of the number four man and number five man tighten the rope and tie it off with a round turn and two hitches with a quick release in the last half hitch.

(10) Once all the personnel have crossed, the number three man secures the number one man's bundle and crosses.

(11) The number three man breaks down the knot on the far shore.

(12) The number one man breaks down the knots on the near shore and hooks into the 1/2-inch rope.

(13) The number three, number four, and number five men pull all the slack out of the rope, then pull the number one man across the river.

d. Personnel then reorganize on the other side.

2. Senior person present must inspect all equipment prior to use in this task.

REFERENCE:

FM 21-50, Ranger Training and Ranger Operations, Jan 1962

FM 31-11C-S

071-326-1025

PREPARE A UH-1 HELICOPTER FOR RAPPELLING

CONDITIONS:

You will be provided a UH-1 helicopter or a mockup and the equipment needed for rigging.

STANDARDS:

Within 30 minutes correctly rig a UH-1 helicopter for rappelling.

PERFORMANCE MEASURES:

1. Remove all seats from the cargo compartment of the helicopter.
2. Lock cargo compartment doors in the open position. If locks are not present, remove the doors.
3. Pad and tape all sharp edges on the floor and door ledge and the protrusions on the skids.
4. Secure the donut ring to the center of the floor of the helicopter (fig. 1).
 - a. Position the snaphook that is attached to the floating safety ring so that the gate is up and facing the front of the helicopter.
 - b. Position the clamps of the donut ring toward the aft end of the helicopter.
 - c. Next, place the floating safety ring within the donut ring and fasten with a snaphook to the single tiedown ring. The floating safety ring is referred to as the number two anchor point for the rappelling ropes. Either one of the following two types of floating safety rings may be used:

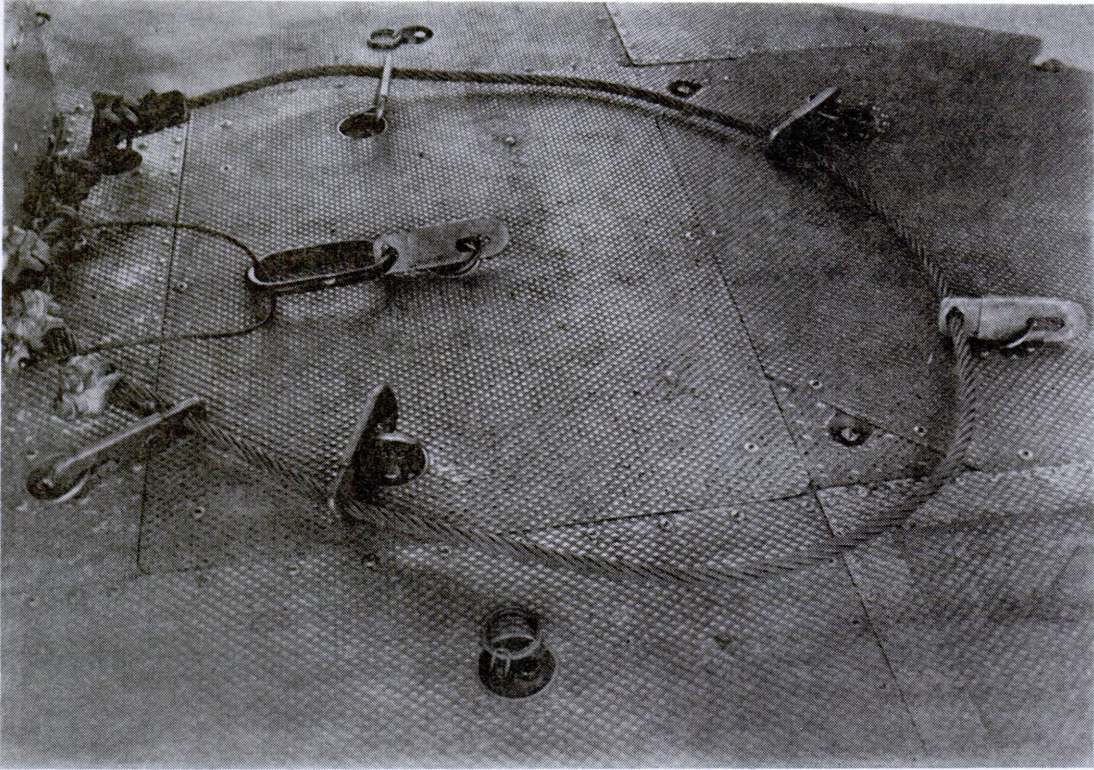


Figure 1. Donut ring attached to the floor of the helicopter.

(1) An elliptical rappelling ring will be threaded through the free end of the cable. A seventh parachute static line snaphook will be threaded onto the ring prior to welding. The ring will be welded together so that it will withstand a pull of 3,000 pounds.

(2) Two snaplinks will be attached to the helicopter tiedown ring in the center of the donut ring. Attach the snaplinks in the following manner (fig. 2):

(a) Insert the first snaplink through the free end of the cable and the tiedown ring with the gate down.

(b) Insert the second snaplink through the free end of the cable and the tiedown ring with the gate up.

(c) Close and tape the snaplink gates with masking tape.

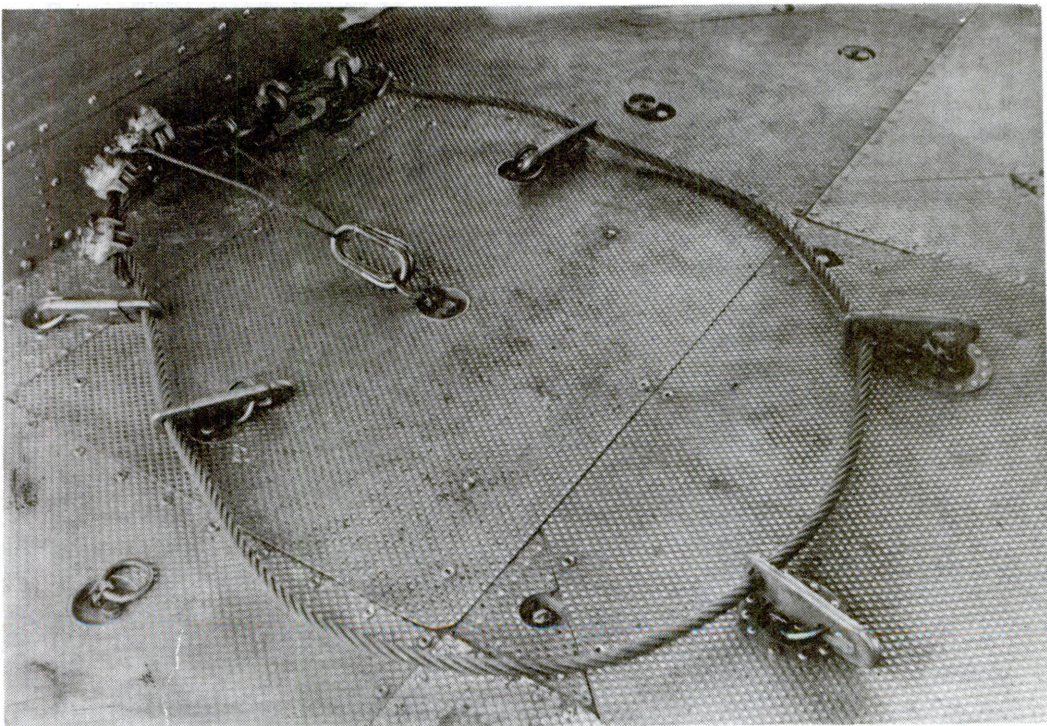
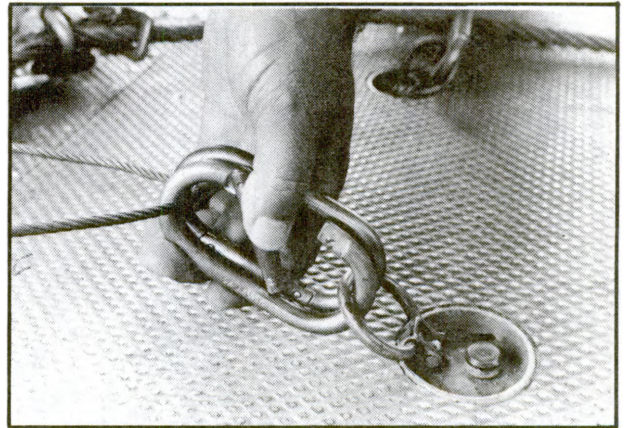


Figure 2. Floating safety ring formed with two snaplinks.

(d) Tape the snaplinks together, insuring that the snaplink gates are on opposite sides of one another.

5. Secure two snaplinks on the rappelling rope approximately 18 inches apart by using two anchor knots.

6. Secure the snaplinks to the donut ring and the floating safety ring with the gates up.

7. The rappelling rope is connected to the floating safety ring and the donut ring in the following order (figs. 3 and 4).

a. The number one anchor point (donut ring). Attach snaplink number one as follows:

(1) Take a bight approximately 5 feet from the running end of the rope as it is uncoiled from the coiling log.

(2) Insert the rope into the snaplink.

(3) Make one turn through the snaplink forming a round turn.

(4) Secure the round turn to the snaplink with two half hitches.

(5) Make the connection to the donut ring by snapping the snaplink up, fastening it to the cable. The gate will remain facing upwards with the opening facing away from the knot.

b. The number two anchor point connection (floating safety ring). Attach the number two snaplink in the same manner except--

(1) Take a bight approximately 2 feet from the running end of the rope.

(2) Connect the snaplink to the rope in the same manner as the first connection. Tape the running end of the rope and the knots with masking tape or green engineer tape to secure them in place.

(3) Make the connection to the floating safety ring in the same manner as the connection to the donut ring.

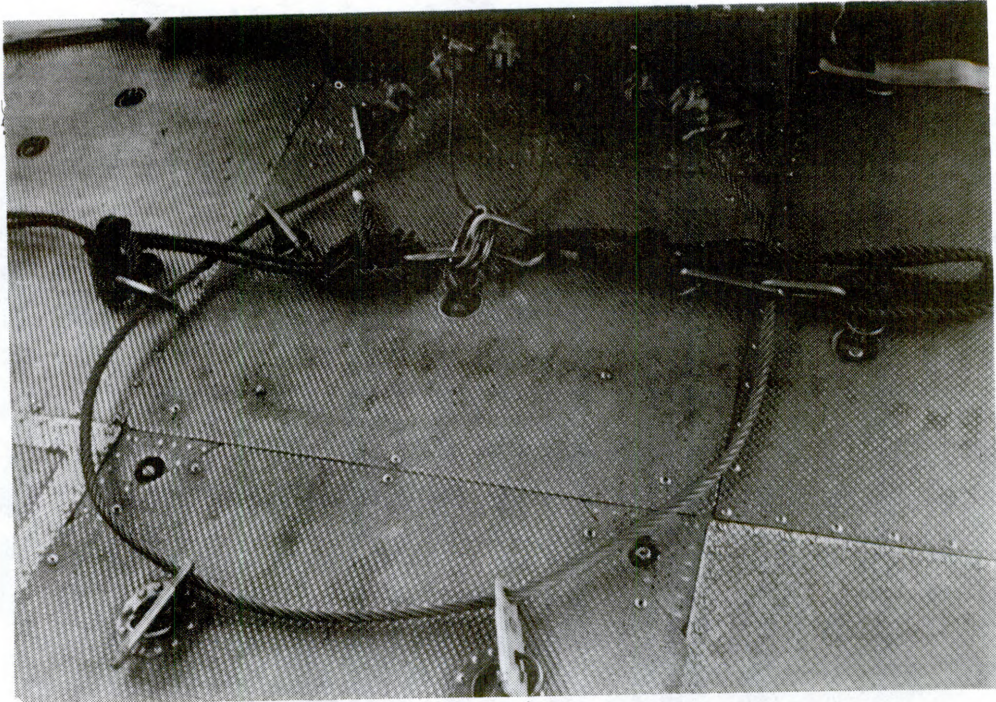


Figure 3. Rappel rope connection in the helicopter.

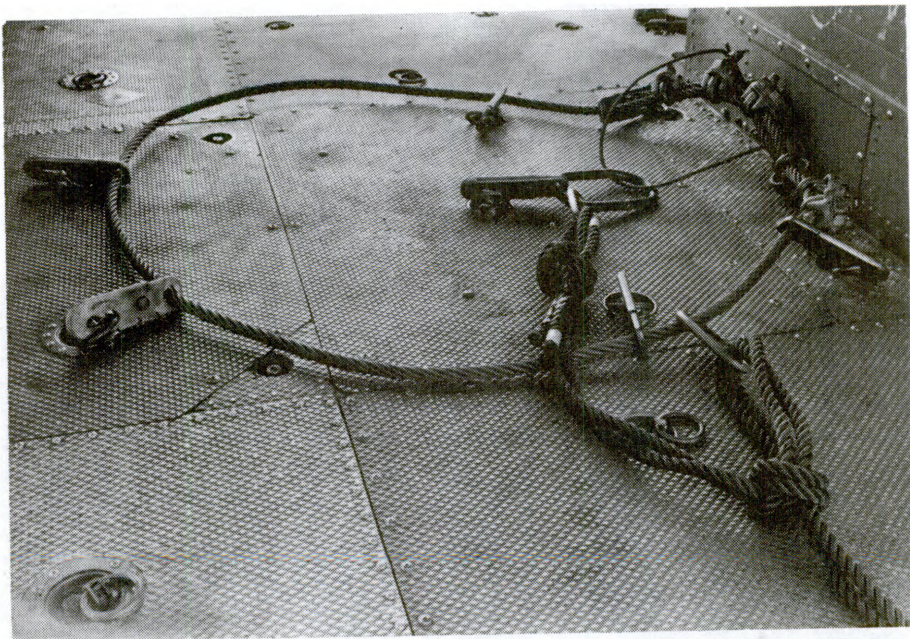


Figure 4. Rappel rope connection using two snaplinks for the floating safety ring.

REFERENCE:

NONE

071-326-1026

RAPPEL FROM HOVERING HELICOPTER

CONDITIONS:

In a training or combat environment, given individual weapon, pack and/or rucksack, web equipment (as dictated by individual in charge of training), steel pot with chinstrap, gloves, snaplink, rappelling seat (12-foot nylon sling rope) or rappel harness, 120-foot rappelling rope rigged at the standing part with two anchor point snaplinks and running end coiled around coiling log, a UH-1 helicopter rigged for rappelling, safety NCO, and procedural and safety briefings.

STANDARDS:

1. Follow all instructions of the safety NCO.
2. Descend safely to the ground in accordance with the performance measures.

PERFORMANCE MEASURES:

1. Prepare to Rappel.
 - a. Coil rope. Lay running end of double rope along length of coiling log. Coil double rope around both the running end of rope and coiling log. Insure that rope is coiled evenly and tightly (fig. 1).
 - b. Don equipment.
 - (1) Insure that shirt is tucked securely in trousers, sleeves are buttoned up.
 - (2) Rig a rappel seat with snaplink or put on a rappel harness.
 - (3) Don remaining equipment to include steel pot with chinstrap fastened, gloves, pack and/or rucksack, web equipment (as dictated by individual in charge of training), rifle slung diagonally across back, sling tight and muzzle down on opposite side of brake hand.

(4) Tape all loose strap ends to avoid entanglement with rappel rope.

CAUTION: No equipment will be on brake hand side of pistol belt.

c. Hook into helicopter. Secure 120-foot rappelling rope and coiling log and approach helicopter.

(1) Rappeller wearing rappel seat.

(a) Upon entering the helicopter, grasp the end snaplink on the rappelling rope and secure it to the floating safety ring, gate facing upwards and opening away from the knot in the rope. Grasp second snaplink on rappelling rope and secure it to the donut ring in the same manner as first snaplink (fig. 2).

(b) Rappeller will then face rappel rope, place it through the snaplink, and bring the standing part of the rope through the snaplink so a full turn of the rope is through the snaplink.

NOTE: One additional full turn should be placed through snaplink if rappeller's weight exceeds 190 pounds.
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(2) Rappeller wearing rappel harness.

(a) Rappeller wearing rappel harness must first route his rappelling rope through the rappel ring twice before hooking rappel rope to anchor system (donut ring and floating ring assembly) (fig. 3).

(b) Standing part of rappel rope is then secured to anchor assembly by grasping end snaplink on rappelling rope and securing it to floating safety ring gate facing upwards and opening away from knot in the rope. Grasp second snaplink on rappelling rope and secure it to donut ring in same manner as first snaplink (fig. 2).

(c) Assume sitting position on floor of helicopter near edge of aircraft door with brake hand on, insuring that there is no slack between donut ring and brake hand.

(d) When coiling log is placed in lap, secure coiling log by placing one end under inside leg and other half on top of outside leg (fig. 4).

(e) Check equipment and insure rappelling rope is not tangled on any part of interior of helicopter or equipment and rappelling rope is properly fed through rappelling ring/snaplink.

d. Assume position.

(1) On command, "GET READY," look toward donut ring and pull rope to check anchor point connection. Then check rappel seat snaplink/rappel harness rappel ring to insure rope is properly inserted. Sound off with, "Ready."

(2) On command, "SIT IN THE DOOR," swing legs around to outside edge of helicopter door and take up a sitting position, keeping the brake hand on (fig. 5).

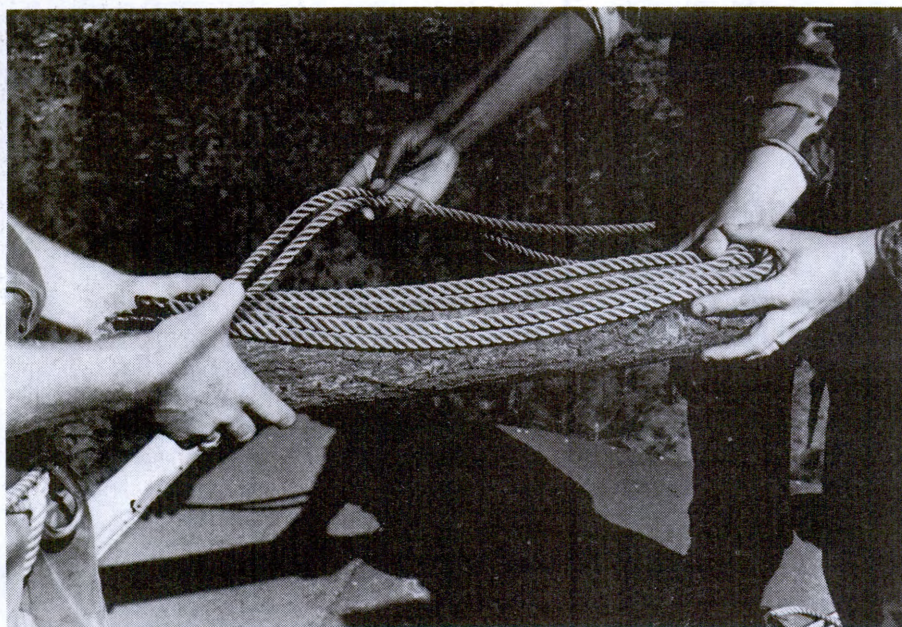
(3) On command, "DROP ROPE," drop coiling log with guide hand, insuring rope does not fall between cargo compartment and skid and that the rope is not tangled or fouled. Insure rope is touching the ground. Sound off with, "Rope clear."

(4) On command, "POSITION," use guide hand and apply brake as necessary to assist in mounting and pivoting 180° on helicopter skid bar. Face the interior of the helicopter, spread feet shoulder width apart, lock knees, and bend forward at the waist, forming an "L" shaped body position (figs. 6 and 7). Rappeller and safety NCO will then conduct final visual inspection of hookup.

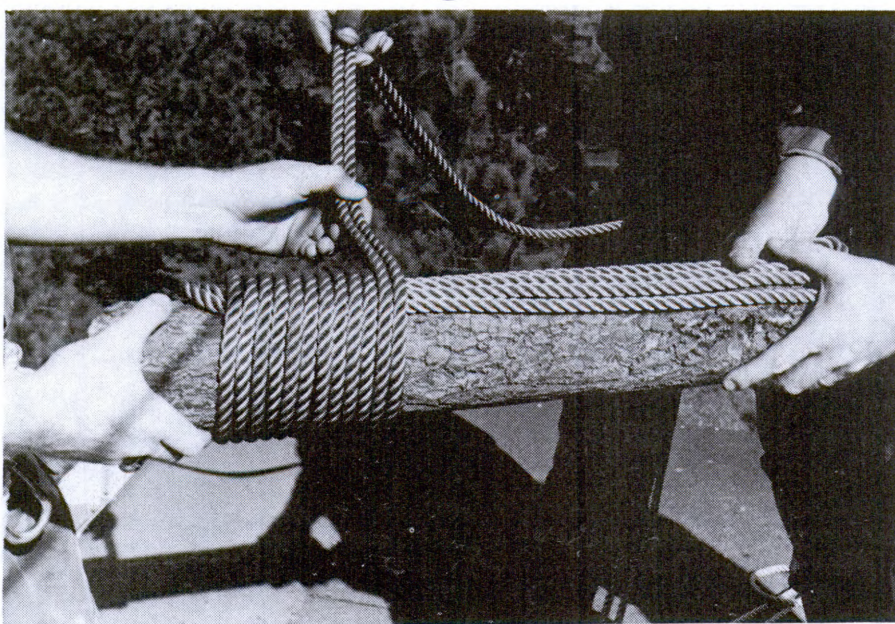
2. Rappel. Execute rappel.

a. Upon command, "GO," bound out from the skid, extend brake hand toward ground, allowing rope to pass through guide and brake hands, descending approximately 8 feet per second (fig. 8).

b. During descent, look at ground over brake hand, keeping feet together, legs straight, and body in "L" position. Initiate breaking action slowly (fig. 9).



1



2

Figure 1. The coiling log.

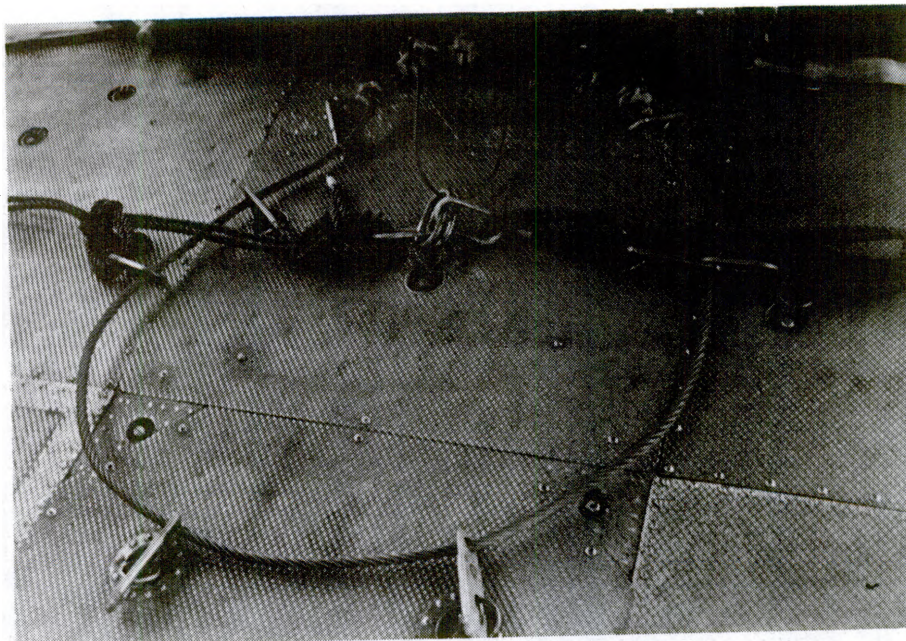


Figure 2. Rappel rope connection using two snaplinks for the floating safety ring.



Figure 3. Placement of the rappel rope through the snaplink.



Figure 4. Rappeller on helicopter after looking up and checking his equipment.



Figure 5. Rappeller sitting in the door of a helicopter.



Figure 6. Rappeller's position on skid.



Figure 7. Rappeller in "L" body position.



Figure 8. Rappeller kicks away from skid.



Figure 9. Rappeller looks at ground during descent.



Figure 10. Alternate (cross-chest) method of braking.

NOTE: Alternate (cross-chest) method of braking may be employed to facilitate rappelling with heavy equipment and/or through dense vegetation. Route rappel rope through snaplink or steel ring on rappel seat or rappel harness, around one side of rappeller and along his back to other side where rope rests in rappeller's brake hand. To brake (fig. 10), the rappeller moves his brake hand toward his chest and in a curling motion.

b. Complete rappel. Upon reaching ground, clear the rappel rope through the snaplink or rappel ring until it is free.

REFERENCE:

FM 57-38, Pathfinder Operations, Oct 68, C1, 2 (app G, Sec III, IV)

071-326-1027

RAPPEL FROM A 35-FOOT RAPPEL TOWER

CONDITIONS:

You will be given the required rappel equipment, rucksack, combat equipment, M-16 rifle, at a 35-foot rappel tower.

STANDARDS:

Rappel twice without equipment and twice with equipment from the ramp and skid side of a 35-foot tower.

PERFORMANCE MEASURES:

NOTE: All safety rules for tower training will be followed.

1. Adjust the rappel harness or Swiss seat and attach the snaplink and/or rappelling ring in the proper manner (fig. 1). Prepare the snaplink and/or rappelling ring for both a right-handed and a left-handed rappel.



Figure 1. Swiss seat with snaplink.

2. On command, "HOOK UP"--

a. Move to a position 3 to 4 feet from exit edge of tower. (For a right-handed rappel, move to the left side of the rope facing the donut ring; for a left-handed rappel, move to the right side of the rope.)

b. Face the rope and place it through the rappel ring or snaplink if there is no rappel ring.

c. Make one complete turn of the double rope by inserting it through the rappel ring still snaplink twice.

d. Connect the rope to the donut ring and then to the floating safety ring. Insure that you have enough slack between you and the donut ring to reach the edge of the door (fig. 2).

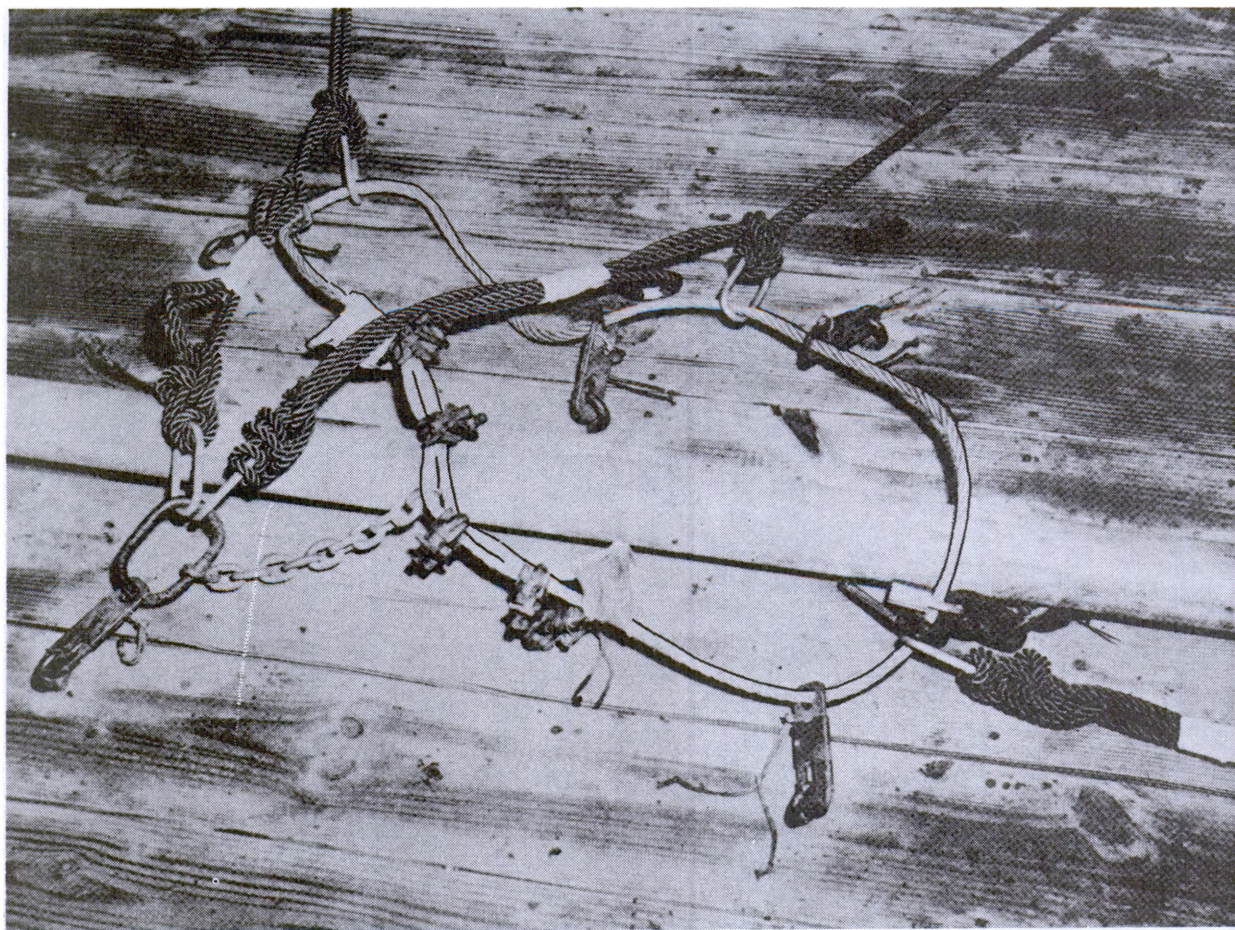


Figure 2. Donut ring on the tower.

3. On command, "CHECK EQUIPMENT"--
 - a. Look toward the donut ring and pull the rope to check the anchor point connection.
 - b. Check the rappel harness or Swiss seat and the rappel ring or snaplink to insure rope is inserted properly.
 - c. Report, "Equipment Checked," and place brake hand in position behind right buttock with brake on.
4. On command, "SIT IN THE DOOR," swing legs to the outside edge of the tower and take up sitting position (fig. 3).



Figure 3. Rappeller "sitting in the door."

5. On command, "DROP ROPE"--

a. Drop coiling log with rope out and away from the tower using guide hand. Insure the rope does not fall between the side of the tower and the skid gear.

b. Lean out and insure that the rope is touching the ground and is not knotted or tangled.

c. Report, "Rope okay."

6. On command, "POSITION"--

a. Using guide hand and the anchor end of the rope, pivot 180° on the skid gear.

b. Face the platform, feet spread shoulder width apart, balls of the feet on the tower edge, knees locked, and waist bent to form an "L" body position.

c. Conduct final visual inspection of the snaplink and rappel ring (fig. 4).



Figure 4. Rappeller's position on the tower.

7. On command, "GO"--

a. Flex knees and jump backward, letting the rope run through both brake hand and guide hand.

b. Descend by dropping 5 to 10 feet at a time. Keep feet together, legs straight, and maintain a good "L" body position. Look at the ground during descent.

c. Upon reaching the ground and backing all the way out of the rope, yell, "Off rappel," and move quickly away from the tower.

REFERENCE:

None

071-326-3050

PLAN AND CONDUCT AN AMBUSH

CONDITIONS:

You will be given a mission to conduct an ambush at a preselected site; the friendly and enemy situation in the area; 10 to 12 personnel; equipment and weapons to include ammo and demolitions required to conduct the mission; a compass; and a map, overlay, or sketch of the area.

STANDARDS:

1. Plan will include all items listed below.
2. Ambush will be conducted following plan and as indicated in paragraph 2.

PERFORMANCE MEASURES:

1. Plan will include--
 - a. Site of ambush.
 - (1) Making reconnaissance.
 - (2) Analyzing terrain.
 - (3) Preparing concealed positions.
 - (4) Canalizing target into killing zone.
 - b. Routes to be used to enter ambush site.
 - c. Organization of ambush; location and duties before, during, and after ambush of--
 - (1) Patrol headquarters.
 - (2) Assault elements.
 - (3) Support element.
 - (4) Security element.

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- d. Equipment needed.
 - e. Camouflage required.
 - f. Occupation of site and camouflage of position.
 - g. Location of rally points and primary and alternate routes of withdrawal.
 - h. Password and countersigns.
2. Conduct of ambush.
- a. Enforce noise and light discipline.
 - b. Use signals for control.
 - c. Follow fire discipline.
 - d. Execute assigned tasks.
 - e. Withdraw to objective rallying point.

REFERENCE:

FM 21-75, Combat Training of the Individual Soldier and Patrolling,
Jul 67 (chap 16)

071-326-5501

CONTROL RATE AND DISTRIBUTION OF FIRE

CONDITIONS:

As fire team leader, while conducting any tactical mission, when fire must be placed on enemy troops or vehicles. (Tracer ammunition for the fire team leader's weapon and pyrotechnics may or may not be available.)

STANDARDS:

The fire team leader will select a method of fire control (for any situation encountered) which, when used, will let every member of his fire team know--

1. When to start/stop firing.
2. What general area to fire into.
3. How fast (rate) to fire.

PERFORMANCE MEASURES:

- | |
|---|
| <p>NOTES:</p> <ol style="list-style-type: none">1. All methods and techniques for controlling team fires are dependent upon collective training of the entire team in order to be effective. The following guidance, although it is directed at the leader in order to train him in the selection of fire control methods, must be followed by team training.2. The squad/team leader must be able to have his men open fire or cease fire at the instant he desires, to adjust fire, to shift all or part of the fire from one target to another, to regulate the rate of fire, and to concentrate or distribute fire as required. For this, the team must practice methods of fire control and develop teamwork. |
|---|

1. Signals for Fire Control. There are several ways to control team/squad fire. The noise and confusion of battle will limit the use of some of them. Therefore, leaders must have

more than one method and then use the method or combination of methods which does the job best.

a. Oral. This is a good method except when the leader is too far away from his men or the noise of battle makes it impossible for them to hear him.

b. Arm-and-hand signals. These are used when the troops can see their leader. All men in a rifle platoon should know and practice the standard arm-and-hand signals.

c. Pyrotechnics. In some cases, fire can be started or stopped by a smoke grenade of a specified color or by a flare.

d. By example. The most common method a team leader uses to start his team firing and to direct their fire is by setting the example. His men hear him shoot and see where he shoots. They do the same. The leader may use tracers to help him point out targets to his men.

(1) Mark the target: By firing at the center of the target and the right and left limits of fire, if appropriate. The two fire team members on the right engage the target from center to the right limit; the two men on the left engage the left half of the target.

(2) Establish the rate of fire: The team leader establishes the rate of fire by example. His men will copy his rate of fire.

e. Prearranged event. The men can be told to start shooting when approaching enemy reach a certain terrain feature. A "commence-fire line" can be a hedgerow, a stream, a ridge, etc. This type signal helps a unit deliver surprise fire on the enemy.

2. Fire Distribution. Fire distribution is the quickest and best way to get fire on all parts of a target. Fire must be distributed to keep all parts of target under suppressive fire. Fire team leaders put fire on targets or target areas so that the enemy, whether visible or not, is kept under fire. A squad SOP may call for the left fire team to engage the left half of a linear target or the front half of a column target. This makes sure that the whole target is engaged, not just those enemy soldiers nearest the squad firing. To maximize effectiveness of team fires--

a. Engage any exposed enemy personnel.

b. When enemy personnel are not exposed--

(1) Engage any visible enemy positions at the probable firing points (e.g., bunker ports and doors, top front edge of trenches, windows, doors, and firing loopholes in buildings).

(2) Engage probable battlefield positions (base of trees, stumps, bushes—anything you would use for cover if you were in his situation).

3. Rate of Fire. The rate of fire for the fire team should be increased until enemy fire is noticeably reduced or stopped. The rate of fire should then be held at that level until the enemy positions can be occupied or destroyed or, in the defense, the enemy attack can be repulsed.

REFERENCE:

TEC Lesson 020-071-1051-F, Control Rate and Distribution of Fire

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071-326-5505

PREPARE AND ISSUE AN ORAL SQUAD
OPERATION ORDER

CONDITIONS:

In a field environment, given an infantry squad, a platoon offensive or defensive operation order, and any available pocket-size reference (such as The Infantry Leader's Reference Card, GTA 7-1-27).

STANDARDS:

1. Within the time allotted, develop a clear and concise oral squad order for the offense, or defense, and issue it to your squad. The order must be issued so that each soldier understands his mission and any specific coordinating instructions.

2. As a minimum, a defensive order must contain the following items:

- a. The mission of the platoon.
- b. The mission of the squad.
- c. Location of the defensive position.
- d. Scheme of maneuver.
- e. Type of emplacements and work priority.
- f. Plan for maintaining local security.
- g. Critical signal instructions.
- h. Location of squad leader's position and platoon command posts.

3. As a minimum, an offensive order must contain the following items:

- a. The mission of the platoon.
- b. The mission of the squad.

c. The concept of how the battle will be fought, to include--

- (1) Location of the objective.
- (2) Time of attack.
- (3) Location of the LD or LD/LC.
- (4) Location of the assault position.
- (5) The order and the route of march.
- (6) Consolidation instructions.

d. Critical signal instructions.

e. Location of the platoon leader and squad leader during the attack.

PERFORMANCE MEASURES:

1. Receiving an Operations Order. The most important part of receiving an order is a clear understanding of what your unit has to accomplish in relation to the ground and to the other platoons or squads. Unless you know exactly what you are supposed to do, what the other units are doing, and where and when these actions are to be done, your chances of success are greatly reduced. After hearing the entire order, don't leave until all of your questions have been answered.

THINK-THROUGH THE ORDER

As soon as you receive the order and understand the leader's plan, take a few minutes to go over the notes you took. As you think about the order, answer these questions:

What MISSION(S) did I receive?

How much do I know about the ENEMY?

How does the TERRAIN and WEATHER influence the operation?

What SUPPLIES or EQUIPMENT do I need? Do I need to assign SPECIAL TASKS to anyone?

a. Mission. In analyzing your mission, identify exactly what your unit is to accomplish. Be sure you know how much time

you have to prepare. Make sure you are aware of any restrictions or special tasks that apply to your platoon or squad.

A thorough understanding of the mission will allow you to establish a time schedule for your preparation. You will be told what time the operation is to begin and what time your unit must be ready to go. This allows you to allocate time to prepare for the mission. Identify the things that must be done to get ready and, working backwards from the "ready" time, allow your men time to accomplish each task. This technique is called the reverse planning sequence. Here is how it might work for a squad leader.

1415:	Inspect assembly area.
1400:	Inspect squad.
1315:	Issue order to squad.
1300:	Finalize squad order.
1200:	Reconnoiter with platoon leader/receive order.
1100:	Issue warning order to squad.
1040:	Receive platoon warning order.

b. Enemy. Develop the best picture of exactly where the enemy is located, what his strength is, and what kind of weapons and equipment he has. Tell your men as much as you know about how to destroy or suppress the kind of enemy you are likely to meet.

Sometimes the enemy in a certain area will use the same pattern over and over. For example, if you know that the enemy habitually ambushes in the vicinity of trail junctions, make sure that all of your men know about it.

c. Terrain and weather. Most decisions pertaining to route, objective, sectors of fire, positioning of key weapons, movement techniques, etc., are made by the platoon leader. However, both platoon and squad leaders must study every bit of ground if they are to properly employ their men and equipment and gain an advantage over the enemy. Proper use of terrain will--

Provide cover and concealment before, during, and after the battle.

Increase the effectiveness of your fire.

Decrease the effectiveness of the enemy's weapons.

You must also understand how weather can influence your men. Cold, heat, rain, or snow can create problems if you don't prepare your squad properly.

d. Supplies, equipment, and special tasks. Look at your unit in light of the mission you are to accomplish. If you have been given a task that requires a special skill, such as setting demolitions to blow a building, do you know how to do it? Do you have the right kind of weapons, equipment, and supplies? If you feel you need help, or if you need something you don't have, tell your leader/commander.

2. Issuing an Operation Order. After you have received an operation order, thought it through, and prepared your own order, you must issue that order. Whenever possible, platoon leaders should issue their orders from a position that allows the squad leaders to see the ground on which they are going to operate.

Squad leaders should also try to issue their orders from vantage points that overlook the terrain. However, many times this will not be possible, and they will have to sketch the terrain on the ground. Terrain models are easy to construct and allow the leader to associate his order with terrain features so that each man will have an idea of what to expect once he gets on the actual terrain.



3. The Operation Order. An operation order is nothing more than the presentation of the information and instructions needed to accomplish a specific mission. The amount of detailed information included in your operation order depends on the information you received and the time you have to prepare.

Below is an example of how you can organize your order to insure that you tell your platoon or squad everything they need to know to perform the mission you were given. The purpose of this format is to help you prepare your order. Use it as a checklist and remember that it is a guide. Give your order in language that your men can understand. For example, you may prefer to say, "Here's how we are going to get the job done," rather than "Execution."

SITUATION

Information on enemy and friendly forces to include the mission and intended actions of at least the next higher headquarters and unit on your left and right.

MISSION

What your unit (platoon or squad) is to accomplish.

EXECUTION

Your tactical plan for accomplishing the mission.

Tasks (missions) of each squad (the platoon order) or of teams and individuals (the squad order).

SERVICE SUPPORT

Administrative information to include the plans for ammunition, resupply, casualty evacuation, and rations.

COMMAND AND SIGNAL

Signals and other control measures to be used during the operation.

Where you will be during the operation and where the next higher leader will be.

REFERENCE:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (chap 2, sec III, pages 2-11 thru 2-18)

071-326-5610

**IMPLEMENT INFANTRY SQUAD MOVEMENT TECHNIQUES
WHEN NOT IN CONTACT WITH THE ENEMY**

CONDITIONS:

As the squad leader of an infantry squad, given an operation order to conduct movement (movement to contact, reconnaissance patrols, etc.). During the movement, enemy contact is "not likely," "possible," or "expected," at any given time.

STANDARDS:

1. Employ the correct movement technique, based upon the likelihood of contact and your mission.
2. Insure proper distances are maintained between fire teams and individuals so that contact is made with the smallest force possible, and one fire team is available to support the other at all times.
3. Maintain a position that allows you to best control the squad.

PERFORMANCE MEASURES:

1. Your squad will spend far more time moving than actually fighting. This fact alone makes it important to use the best movement techniques, but an even more important reason for proper movement is that a carelessly moving unit usually makes contact with the enemy at a time and place of the enemy's choosing. You must use movement techniques which will cause contact to be made by the least number of men, with the rest of the squad in the best position to provide suppressive/supportive fires and to maneuver and close in on the enemy.

2. The choice of movement technique is based on the likelihood of contact.

LIKELIHOOD OF CONTACT		MOVEMENT TECHNIQUE
1	<i>Not likely</i>	<i>Traveling</i>
2	<i>Possible</i>	<i>Traveling Overwatch</i>
3	<i>Expected</i>	<i>Bounding Overwatch</i>

NOTE: When conservation of time is vital to mission accomplishment, movement techniques may be selected based on speed rather than likelihood of contact. Movement techniques are not fixed formations. Distances between squads vary based on the terrain and visibility. As the terrain becomes more rugged, as the vegetation becomes dense, or if visibility is reduced, the distances between squads are reduced. Squad leaders maintain visual contact with the squad to their front. One man in each squad maintains visual contact with the squad to the rear. The platoon should be able to move most of the time using arm-and-hand signals for control.

3. When your squad is moving, you should--

a. Use the TRAVELING technique when speed is necessary and contact with the enemy is not likely. ONE FIRE TEAM FOLLOWS THE OTHER, keeping about 20 meters apart, depending on the terrain. When traveling, the best location for the squad leader normally is with the lead team to aid navigation, movement, and control (fig. 1).

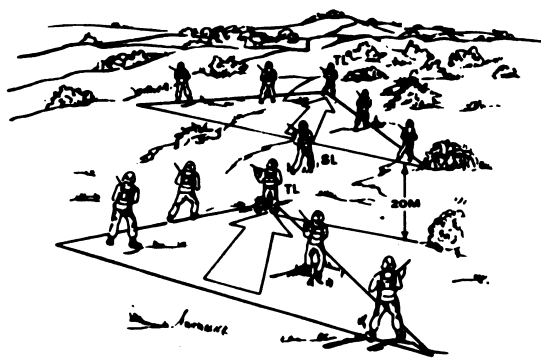


Figure 1. Traveling technique.

b. Use the TRAVELING OVERWATCH technique when chance of enemy contact is possible, but not expected. Caution is justified but speed is desirable. The trailing team drops behind the lead team about 50 meters and is prepared to support the lead fire team. If the lead fire team receives fire, the trailing team is far enough to the rear so it will probably not be suppressed by the same enemy fire, yet close enough to fire and/or maneuver in support of the lead team (fig. 2).

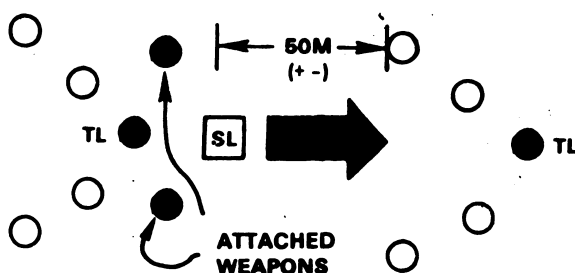


Figure 2. Traveling overwatch technique.

When using traveling overwatch, the leader goes where he can best control his squad in the event of contact. Normally, this is with the trailing team, keeping any attached weapons near himself and under his direct control. This follows the rule of using the least number of men to find the enemy and enhances his ability to support the lead team by fire and to influence the situation. As an exception to his normal location with the trail team, the squad leader may temporarily accompany the lead team when conditions so dictate, such as when limited visibility precludes good control of the squad from the trail team's position.

c. Use the **BOUNDING OVERWATCH** technique when contact is expected. One fire team advances while the other team is in a good position ready to suppress enemy fires. The key to this movement is the proper use of terrain. **ALL MEN IN THE SQUAD MUST MAKE USE OF ALL COVER AND CONCEALMENT.** The chance of exposure to the enemy must be avoided. A bound is normally not more than 100 to 150 meters forward of the overwatch team (fig. 3).

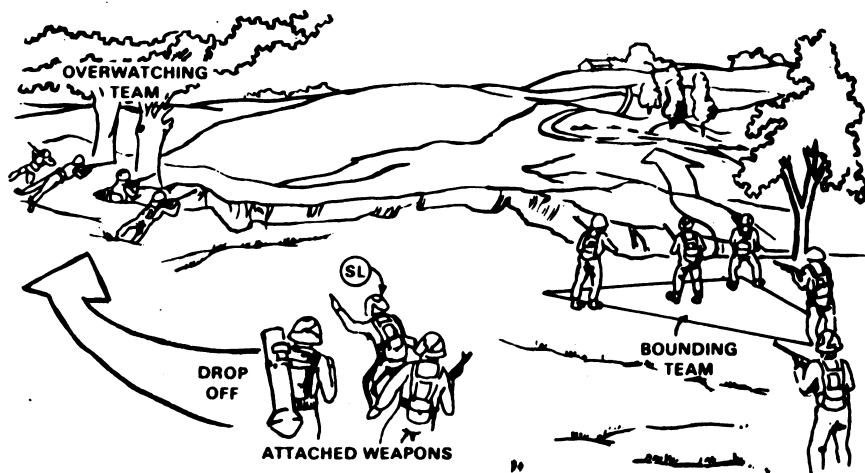


Figure 3. Bounding overwatch technique.

THE SQUAD LEADER MUST ISSUE CLEAR, CONCISE ORDERS. He must insure that the bounding team leader knows (at least) where his team is to move and by which route, what to do when he gets there, the location of the squad leader and the overwatch team, and how he will get his next instructions. The squad leader must insure that the overwatch team leader knows (at least) the route and destination of the bounding team. During movement by bounding overwatch, the squad leader must go where he can best control the squad. He may move from one fire team to another. Normally, he will join the overwatching team as the bounding team passes it. In so doing, he normally takes any attached weapon(s) with him. When with a bounding team, the squad leader must not mask the fire of, or interfere with, the movement of the team he joins or leaves. He normally locates himself to the rear and on a flank which facilitates his dropoff to the fire team being passed.

4. When using any of these techniques, the squad leader's knowledge of the proper use of available cover and concealment for the entire squad is essential. Even the best technique applied to the least favorable route can lead to disaster. In addition, intervals between fire teams are important for more than just control. A fire team caught and pinned down by enemy fire will probably never walk away from that spot if the other team cannot immediately suppress that enemy fire. To facilitate control, it is essential that the squad function as a team. All members must have confidence in the squad leader and in their ability to do the job. Practicing these techniques correctly in training will provide the teamwork needed to fight and survive on the battlefield.

REFERENCE:

None

071-326-5611

DIRECT THE FIRE AND MANEUVER OF AN
INFANTRY SQUAD AGAINST AN ENEMY POSITION

CONDITIONS:

You are the squad leader of a squad that has just encountered an enemy position.

STANDARDS:

1. Fix the enemy with all available suppressive fire to keep him from firing his weapons accurately and redeploying his force to meet your assault.
2. Fight the enemy by locating and assaulting his flank, rear, or other weak point.

PERFORMANCE MEASURES:

1. Actions on Contact. When contact is made with an unexpected enemy, locate and exploit enemy weaknesses without needlessly exposing the squad to enemy fire. When contact is made, take the following actions:

DEPLOY, SUPPRESS, AND REPORT

Lead elements DEPLOY in positions from which they can fire, observe, or maneuver against the enemy. If elements in contact receive direct fire, they immediately SUPPRESS enemy weapons. If you have located the enemy, but do not receive fire, then hold your fire until friendly elements are in the best position to engage the enemy. You immediately REPORT the enemy contact to the platoon leader in as much detail as is available, and continually update reports.

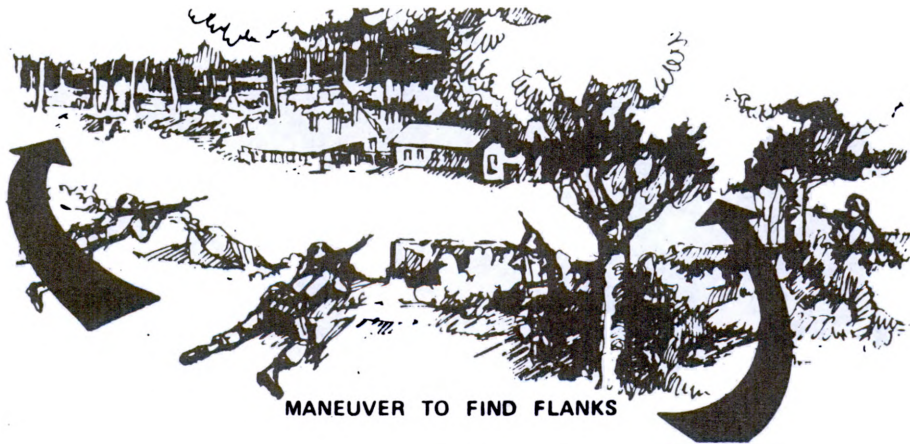
DEPLOY



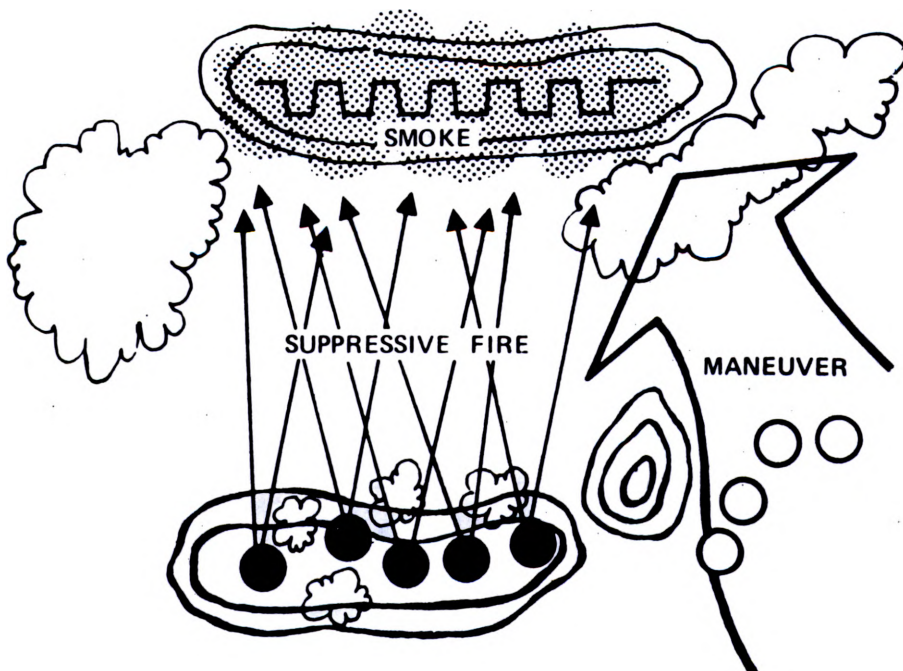
SUPPRESS
AND REPORT



2. Determine Enemy Location, Disposition, and Strength. Squads gain additional information not revealed by the initial contact by careful maneuver against the enemy to determine his flanks or weak points. This process of fighting through enables the unit to continue to advance against the enemy without undue risks. If the initial contact reveals an enemy who is clearly superior, don't risk maneuvering against him, but hold in place, return fire, and serve as a base of fire for the platoon.



3. Choose a Course of Action. The squad leader must decide whether to assault the enemy or hold in place and return fire. Of course, you may be given another course of action by your platoon leader.



4. Fixing the Enemy. To close with the enemy, the assaulting force must reduce the effects of his fire. This is accomplished either by blocking the enemy's vision by smoke or by shooting at him with sufficient accuracy and volume to drive him from his firing position. In either case, the enemy will probably continue to fire, but the fires will be inaccurate and cannot be redirected effectively against the maneuver force. When the enemy is suppressed, you can maneuver toward his positions without taking excessive casualties. The assaulting force always attempts to concentrate against the enemy flank, rear, or other weak points. The enemy is normally aware of any weak points and will reinforce them when he realizes that you intend to assault them. Use fire to fix the enemy so he cannot reinforce these weak points. This may be accomplished by suppressive fire. However, while smoke and direct fire may effectively suppress an enemy, they will not keep him from redeploying along an interconnecting trench system. To stop this movement, airburst indirect fires are required. Each situation will be different. Remember, the enemy must be FIXED BY SUPPRESSIVE FIRE.

5. Fighting the Enemy. The squad may have to fight the enemy either on open or restrictive terrain.

a. Open terrain. In open terrain, there are no significant natural or manmade features which severely restrict the fire or maneuver of the squad. An example is a sparsely vegetated area where a squad or platoon may assault using FIRE and MANEUVER. Elements of the squad and platoon alternate as fire support and maneuver elements as they close with the enemy.

b. Restrictive terrain. Restrictive terrain is significant natural or manmade features which will severely restrict the fires or maneuver of the squad. These areas include fortified areas, barbed wire or mined areas, built-up areas, and extremely rugged terrain. In restrictive terrain, platoons and squads normally task organize into--

(1) ASSAULT ELEMENT. To close with and destroy the enemy.

(2) SUPPORT ELEMENT. To suppress and fix the enemy by fire.

(3) BREACHING ELEMENT. To clear or mark a path through enemy obstacles or blow holes in walls for the assault element (if required).

6. Assault Techniques. The squad moves forward as rapidly as possible by crawling, by short rushes, or by employing rushing fire. The fire team leader moves by the best method for the situation facing him, and the fire team members follow his example using every advantage offered by the terrain.



a. Crawling may be required when the fire team faces intense enemy fire and has little cover. Individuals use either the low or high crawl, depending upon their individual situation, the requirement for speed, and the example of their fire team leader. This method is slow, but reduces exposure to enemy observation and fire. Individuals must place fire on the enemy to suppress him when not moving forward. If necessary, the members of the squad may advance all the way into and through enemy positions using the crawl method.

b. Short rushes may be used when available cover permits. Fire and maneuver can be conducted using this method by individuals or fire teams. Assaulting fire teams or individuals may advance by short (2- to 3-second) rushes to avoid accurate enemy fire.



c. Rushing fire is rarely used. It should be used only under the following conditions:

(1) When the squad is receiving a heavy concentration of indirect fire and immediate and decisive movement is necessary to prevent its annihilation.

(2) When the complete lack of cover and concealment prohibits another course of action.

(3) When the squad is not receiving fire.

The squad uses rushing fire by standing up and moving directly to the enemy position as quickly as possible. This does not mean a parade field "dress right dress" configuration, but rather a staggered line allowing enough lateral clearance between men to allow them to deliver effective fire to their front. Movement must be rapid and accompanied by a heavy volume of fire. The assault should be conducted over a short distance that can be covered quickly and concentrated where the enemy's defense may be quickly overrun.

7. Control of Fire. It is vital that fires be heavy enough to suppress the enemy. It would be fatal, however, to allow this suppressive fire to consume all of a squad's ammunition before an assault is made or a possible counterattack is dealt with. Rigid control of fires must be exercised to insure that a steady rate of fire is maintained throughout the assault.

Maximum use should be made of supporting fires such as artillery, mortars, and gunships. Rapid redistribution of ammunition upon the immediate objective will enable a squad to fight off a counterattack or continue the attack on order.

8. Teamwork and Control. A squad without teamwork and control is nothing more than a small mob with weapons. Success depends on the level of these two virtues within the squad. Methods of control are normally established by SOP. These may include arm-and-hand signals, oral commands, whistles and other sound devices, pyrotechnics, and "do as I do" techniques. Once methods are established, training and practice develops the necessary teamwork. This training should cover reaction to as many different battlefield situations and conditions as possible. Even in the event that a member of the squad loses contact with his squad leader and team leader, it is better that his intense training exerts control over him by reminding him what he was taught to do in the past, than it would be for him to improvise his actions alone. It is the squad leader's responsibility to obtain and maintain the control and teamwork of his squad in all situations.

REFERENCE:

None

071-326-5705

ESTABLISH AN OBSERVATION POST (OP)

CONDITIONS:

You are a squad leader or platoon sergeant in a defensive position, given a squad or platoon, all assigned TOE equipment, a TA-312/PT (or TA-1/PT) and/or a radio, and a requirement to establish an OP to observe a designated area or probable avenue of approach forward of or on the flanks of your squad or platoon.

STANDARDS:

Upon moving into the assigned defensive position, you will select and emplace a two-man position which:

1. Is within effective small arms range of the squad/platoon.
2. Allows detection of enemy activity within the designated area or avenue of approach before it would be detectable from the defensive positions and before the enemy could detect the defensive area.
3. Has a means of communication (wire or radio) with the platoon leader (may be through the squad leader).

PERFORMANCE MEASURES:

1. General. OPs are generally established along probable avenues of approach to listen and observe and provide early warning of enemy approach.

2. Selection of an Observation Post (OP).

a. The site selected for an observation post should provide:

(1) Maximum observation of the desired area (specified by the platoon leader).

(2) Cover and concealment for the occupants of the OP.

(3) Concealed routes to and from the OP.

b. Observation is the primary means of determining whether or not the above conditions exist at a site.

c. Usually, the best location for an OP is on or near the military crest of a hill. Topographical crests should be avoided because of the possibility of being skylined. It may be appropriate to establish the OP well down the forward slope when observation is restricted by the terrain (fig. 1).

d. Observation posts and listening posts should be within effective small arms range of unit establishing OP and supported by other supporting fires when possible.

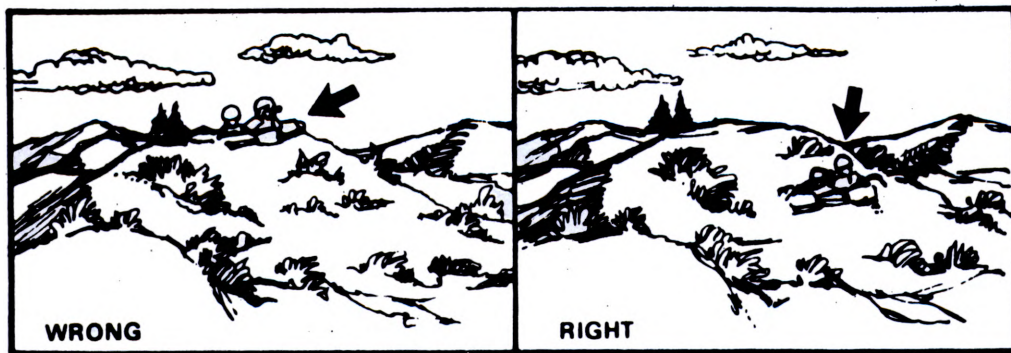


Figure 1

3. Establishing and Operating an Observation Post.

a. Wire is the primary means of communication with an OP and is supplemented by radio. Wire and radio antennas should be carefully positioned and camouflaged to avoid detection by the enemy (fig. 2).



Figure 2

b. Personnel going to and from the OP must move carefully so that movement does not reveal the location to the enemy. Separate routes to and from the OP are established. Camouflage is most important on an OP. The OP should be camouflaged even when natural concealment is adequate.

c. OPs are operated in reliefs. A minimum of two men is necessary for each relief. One observes while the other records and reports observed information. The observer and recorder should switch duties every 30 minutes because the visual efficiency of an observer decreases rapidly after that length of time.

4. Establishing and Operating an Observation Post (OP) During Limited Visibility.

a. This OP is a position from which you listen and observe during periods of limited visibility (darkness, smoke, or bad weather). The enemy may use different, more open avenues of approach during limited visibility conditions; therefore, an OP may have to be moved to another position to serve as an OP at night.

b. These types of OPs are usually closer to defensive positions. You may be given a night-vision device for use on your OP. The enemy employs infiltrators against your defense at night, so a series of competent OPs is your best security. OPs backed up by alert troops equipped with night-vision devices and by snipers can counter this infiltration.

c. OPs are operated in reliefs except when movement to and from positions would reveal their locations or endanger the personnel.

REFERENCE:

FM 21-75,

071-329-1001

IDENTIFY TERRAIN FEATURES (NATURAL AND MANMADE) ON THE MAP

CONDITIONS:

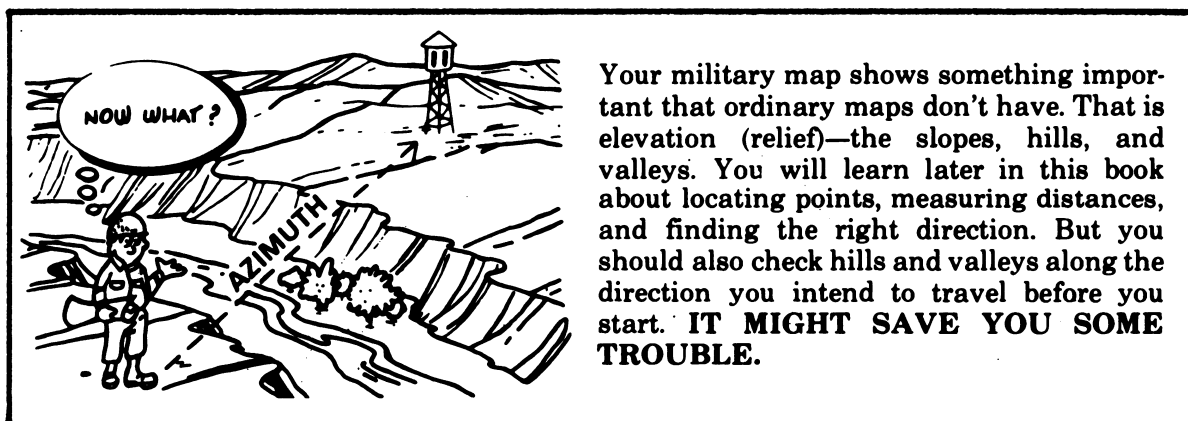
Given a standard 1:50,000-scale military map which includes examples of one or more of each of the natural features identified in 1 through 5 below, and which has examples of the use of colors to identify classes of features as in 6 through 10 below:

- | | |
|---------------|----------|
| 1. Hilltop | 6. Black |
| 2. Ridge | 7. Blue |
| 3. Valley | 8. Green |
| 4. Saddle | 9. Brown |
| 5. Depression | 10. Red |

STANDARDS:

Within 3 minutes, identify one of each type terrain feature marked on the map given to you by your supervisor.

PERFORMANCE MEASURES:



1. To identify terrain features, refer to figure 1.
2. Colors used to identify a class of features.
 - a. Black--The majority of cultural or manmade features.
 - b. Blue--Water features such as lakes, rivers, and swamps.
 - c. Green--Vegetation such as woods, orchards, and vineyards.
 - d. Brown--All relief features such as contour lines.
 - e. Red--Used to classify manmade features as to their type or use; e.g., main roads, built-up areas, and special features.

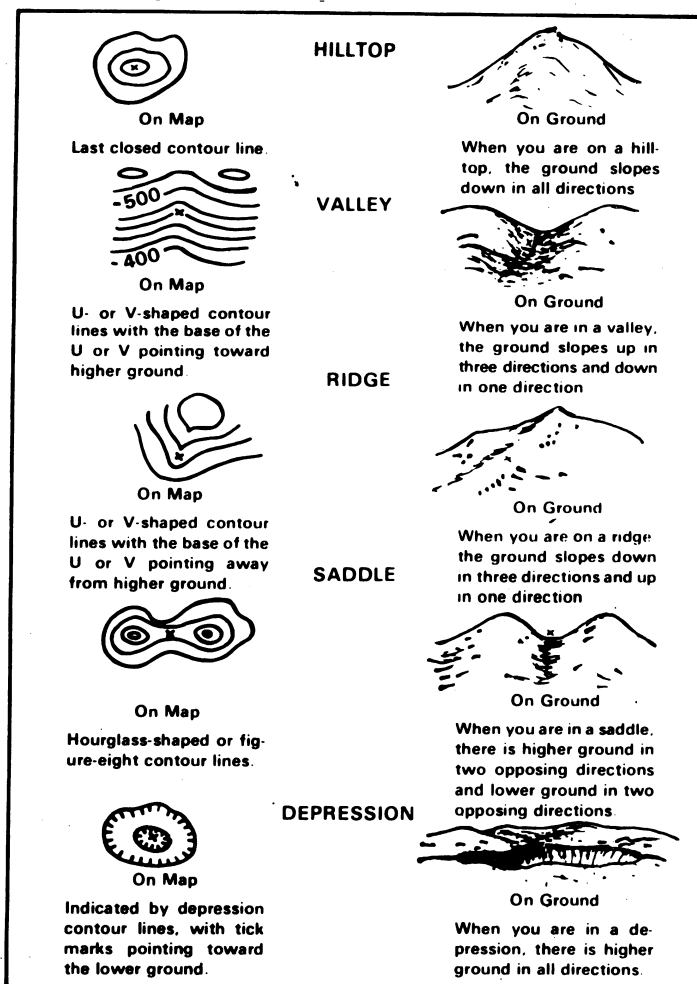
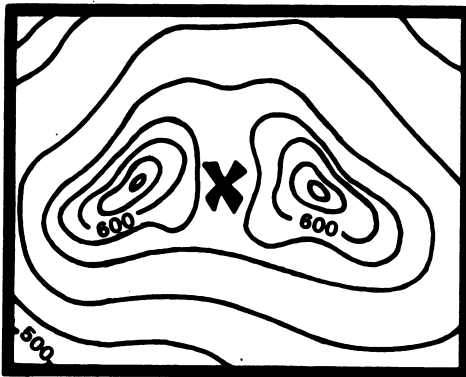


Figure 1

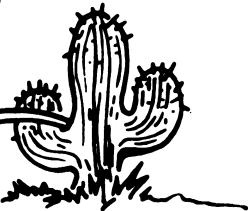
NOTE: Occasionally, other colors may be used to show special information. These will be indicated in the marginal information on the map.



Sometimes contour lines show two hilltops fairly close together. The lower terrain between the two hilltops is called a **SADDLE**. Going through a saddle is sometimes the easiest route to use to get beyond the two hills. Of course, you wouldn't go through a saddle if the enemy was on the hills.

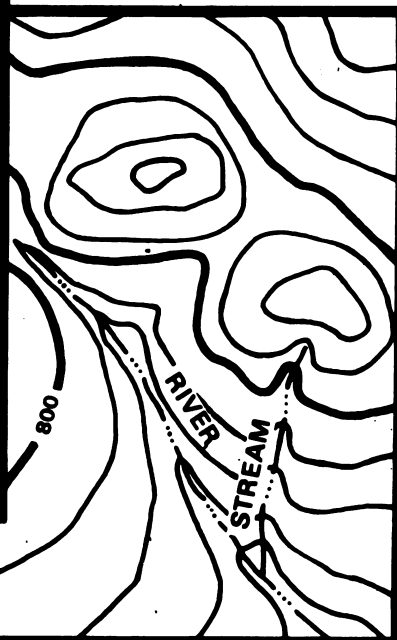


IF IT WAS IN
CALIFORNIA —
WOULD IT BE A
WESTERN
SADDLE?

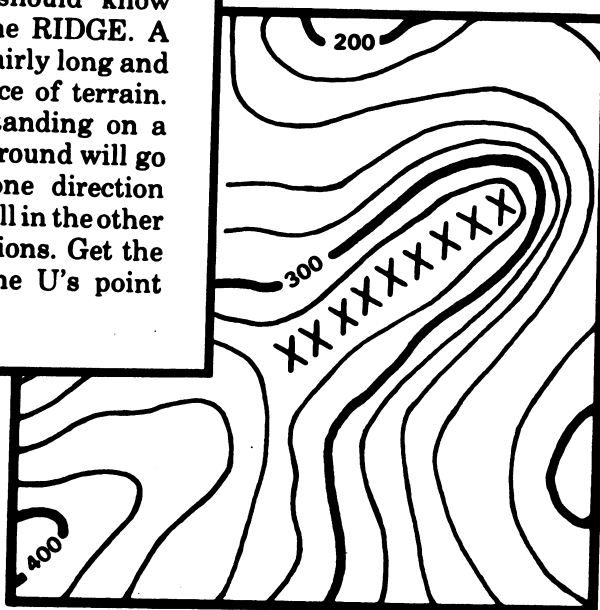


Contour lines across a stream always come together in a "V". The point of the "V" points upstream.

Your legend tells you that water is shown in blue on your map. You already know that streams just don't run along the tops of hills! So looking for streams is a good way to find valleys.



Another terrain feature that you should know about is the RIDGE. A ridge is a fairly long and narrow piece of terrain. If you're standing on a ridge, the ground will go uphill in one direction and downhill in the other three directions. Get the picture? (The U's point downhill.)



REFERENCES:

FM 21-26, Map Reading, C1, Jan 69
TEC Lesson 930-071-0013-F, Introduction to Land Navigation
TEC Lesson 930-071-0016-F, Terrain Features

071-329-1002

DETERMINE THE GRID COORDINATES OF A POINT ON A
MILITARY MAP USING THE MILITARY GRID REFERENCE SYSTEM

CONDITIONS:

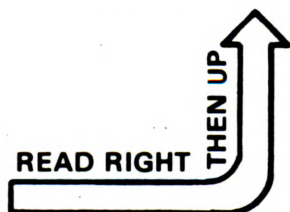
Given a standard, 1:50,000-scale military map, a 1:50,000 grid coordinate scale, a pencil and paper, and a point on the map which is labeled for identification (for example, point A).

STANDARDS:

Within 2 minutes, determine the six-digit grid coordinates for a point to within 100 meters (grid coordinates must be preceded by the correct two-letter 100,000-meter-square identifier).

PERFORMANCE MEASURES:

To keep from getting lost in the boonies you have to know how to find your location or your address. There are no street addresses in a combat area, but the military map can spot your location accurately. It has black lines running up and down (north and south) and crosswise (east and west). They form small squares called grids. These lines are numbered along the outside edge of the map picture. Using these numbers you can name each square.



NO TWO SQUARES HAVE THE SAME NUMBER! TO GET THE CORRECT NUMBER FOR A CERTAIN GRID SQUARE, FIRST READ FROM LEFT TO RIGHT ALONG THE BOTTOM AND FIND THE LINE THAT BORDERS YOUR GRID SQUARE ON THE LEFT. THEN READ UP AND FIND THE EAST-WEST LINE THAT BORDERS YOUR GRID SQUARE ALONG THE BOTTOM.

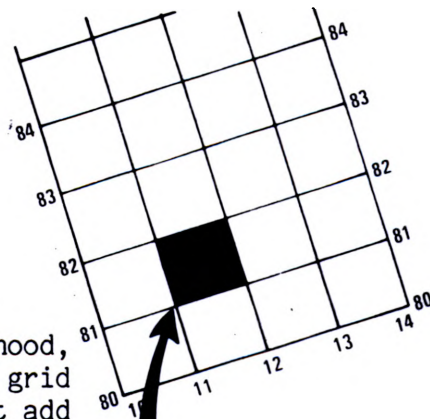


Look at the picture. Your address is grid square 1181. How do you know this? Start from the left and read RIGHT until you come to 11, the first half of your address. Then read UP to 81, the last half. Your address is somewhere in grid square 1181.

Grid square 1181 gives your general neighborhood, but there is a lot of real estate inside that grid square. To make your address more accurate just add another number to the first half and another to the last half--so your address has six numbers instead of four.

Here's how to get those extra numbers. Pretend that each grid square has 10 lines inside it running north and south, and another 10 running east and west. This makes 100 smaller squares. You can estimate where these imaginary lines are.

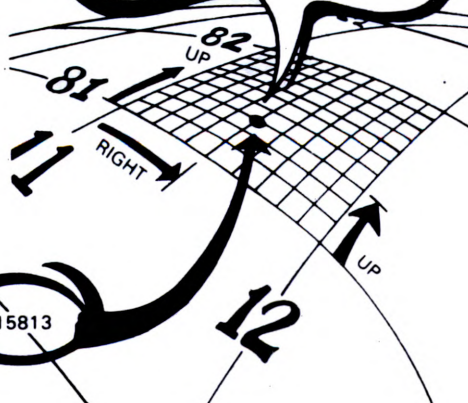
Suppose you are halfway between line 11 and line 12. Then the extra number is 5 and the first half of your address is 115. Now suppose you are also 3/10 of the way between line 81 and line 82. Then the second half of your address is 813. (If you were exactly on line 81, the second part would be 810.) The picture shows that if you were located where the dot is in grid square 1181, then your address would be 115813.



REMEMBER: Read left to right, then read up
READ RIGHT AND UP

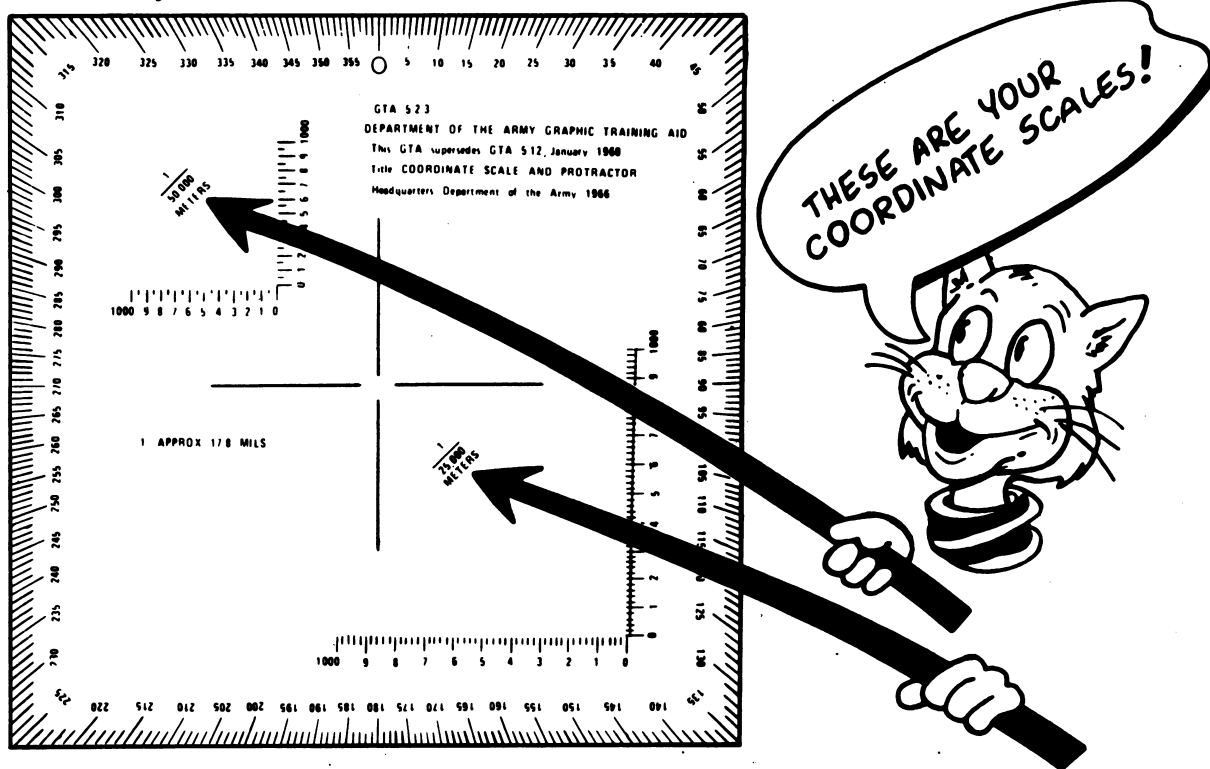


THESE SIX NUMBERS ARE CALLED YOUR COORDINATES. THEY GIVE YOUR LOCATION, AND IF YOU ALWAYS KNOW WHAT THEY ARE, YOU CAN NEVER BE LOST!



79

If you have this little device, you don't have to worry about estimating exactly where you are inside a certain grid square. You don't have to use imaginary lines, because you can come up with your exact coordinates.



This is a coordinate scale and protractor. It helps you measure small distances inside grid squares. You can also measure angles with it. The coordinate scale and protractor is nothing more than a square piece of clear, thin plastic. It is usually called just a "protractor" for short. Here's how to determine the six-digit grid coordinates of a point on a map using a protractor.

1. First locate the grid square in which point A is located (point A should already be plotted on the map). (See fig. 1.)
2. The number of the vertical grid line on the left (west) side of the grid square is the first and second digits of the coordinate.
3. The number of the horizontal grid line on the bottom (south) side of the grid square is the fourth and fifth digits of the coordinate.

4. To determine the third and sixth digits of the coordinate, place the grid coordinate scale on the bottom grid line of the grid square in which point A is located.

5. Check to see that the zeros of the coordinate scale are in the lower left-hand (southwest) corner of the grid square.

6. Slide the coordinate scale to the right keeping the bottom of the scale on the bottom grid line until point A is located under the vertical (right-hand) scale. (See fig. 2.)

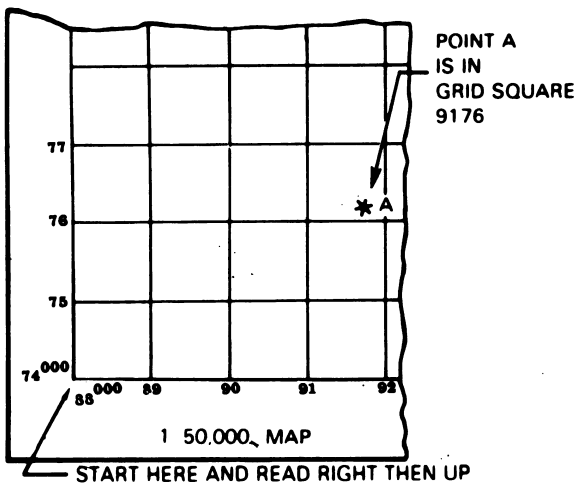


Figure 1

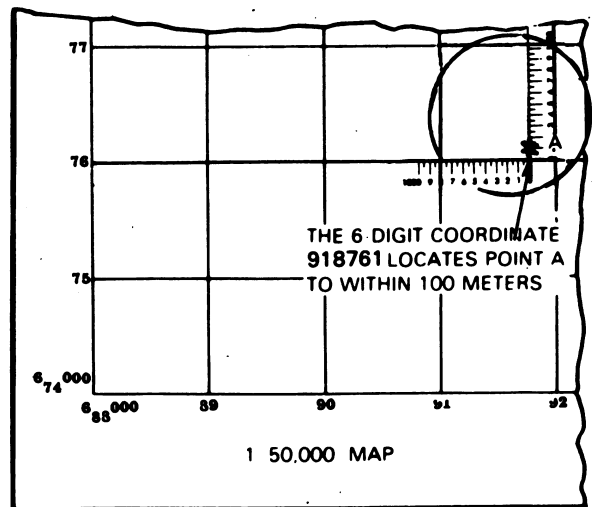


Figure 2

7. The 100-meter mark on the bottom (horizontal) coordinate scale which is nearest the north-south grid line represented by the first and second digit of the coordinate to be determined is the third digit.

8. The 100-meter mark on the right-hand (vertical) coordinate scale which is nearest point A is the sixth digit.

9. Write the six-digit coordinate on the paper provided.

10. Determine the correct two-letter 100,000-meter-square identifier by looking at the grid reference box in the margin of the map.

11. Place the 100,000-meter-square identifier in front of the six-digit coordinate.

NOTE: As an alternate training method to improve mapreading ability, start with a six-digit coordinate and plot the point on the map.

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 3, pages 3-8 thru 3-20, para 3-4 thru 3-7)

TEC Lesson 930-071-0013-F, Introduction to Land Navigation

FM 31-11C-S

071-329-1003

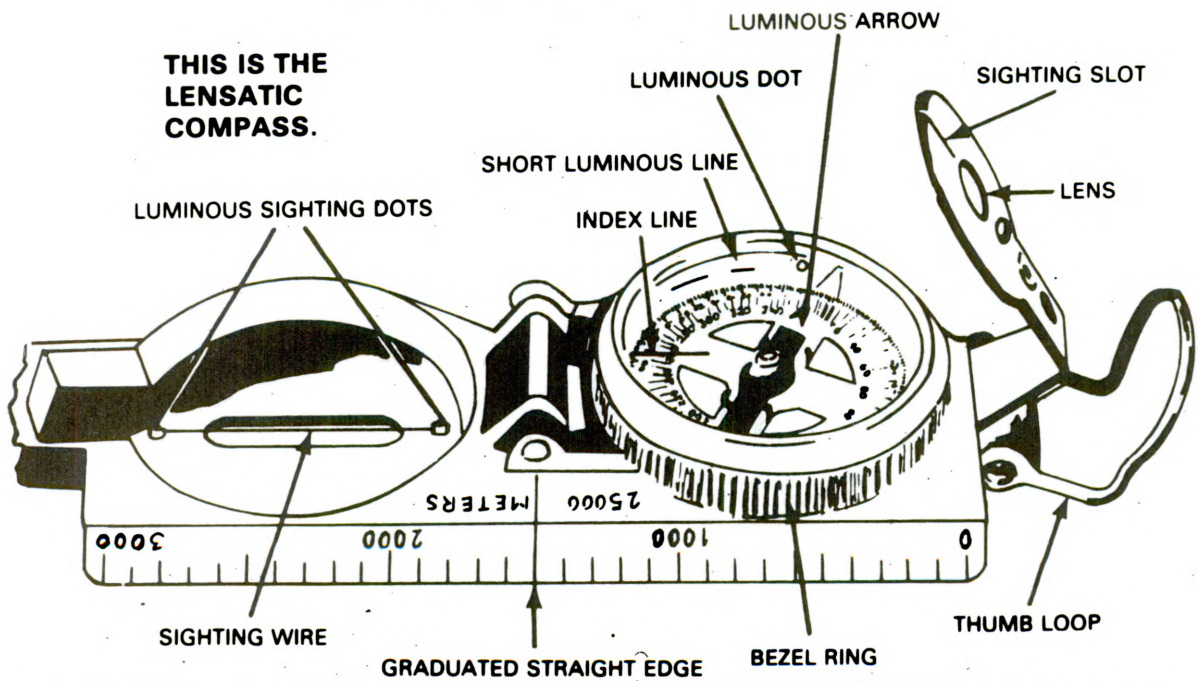
DETERMINE A MAGNETIC AZIMUTH USING A COMPASS

CONDITIONS:

Given a compass (which has been checked against an aiming circle and has no noticeable deviation), a designated point on the ground, in a field environment, under daylight conditions.

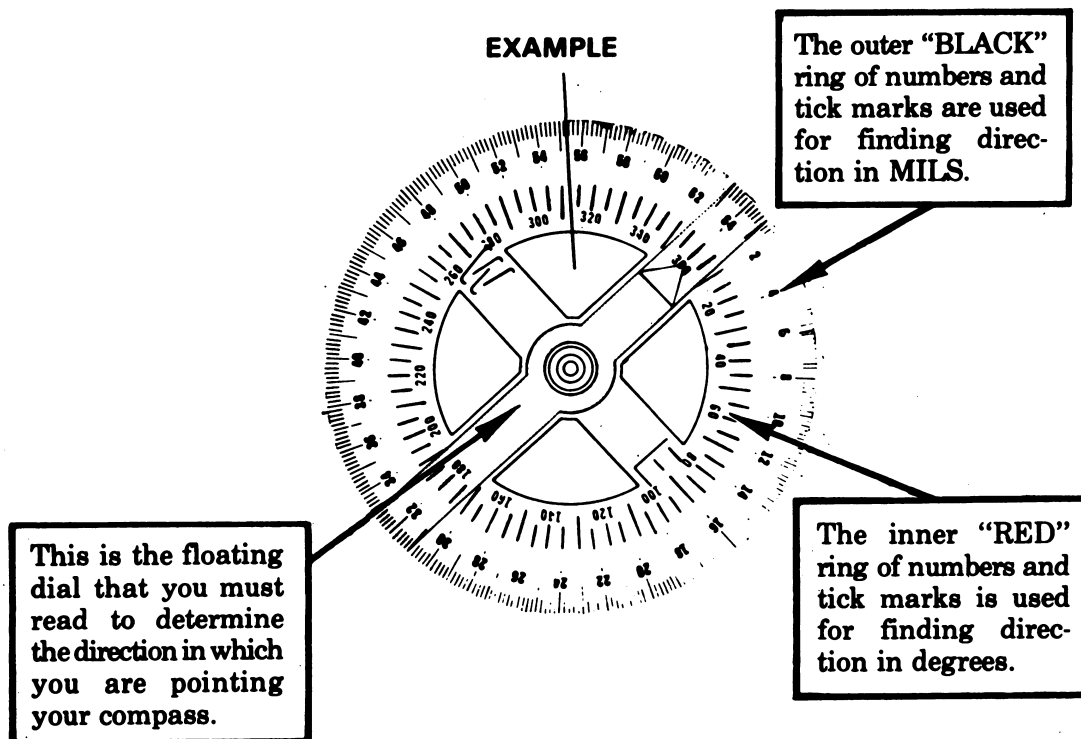
STANDARDS:

Within 1 minute, determine the correct magnetic azimuth to the designated known point, to within 3° , using the center-hold technique.

PERFORMANCE MEASURES:**KNOW YOUR COMPASS**

BEWARE: Your compass is a sensitive instrument and it's your best friend in the boonies. Take care of it and it will take care of you!

HOW TO READ YOUR COMPASS



1. There are 3600 or 6400 mils (m) in a complete circle, and these are marked for you with a tick mark every 5 or 20 m. However, you will notice that not every tick mark is numbered. So you will have to determine the number for these lines using the numbers that are shown.

2. To read direction, point the compass in the direction you want to go or the direction you want to determine.

3. Look beneath the black hairline on the outer glass cover and estimate to the nearest degree of 10 mils the position of the hairline over the (red/black) scale.

4. Be careful to hold the compass still so that the dial remains stationary while you are reading the scale.

5. In the example above, the readings are--

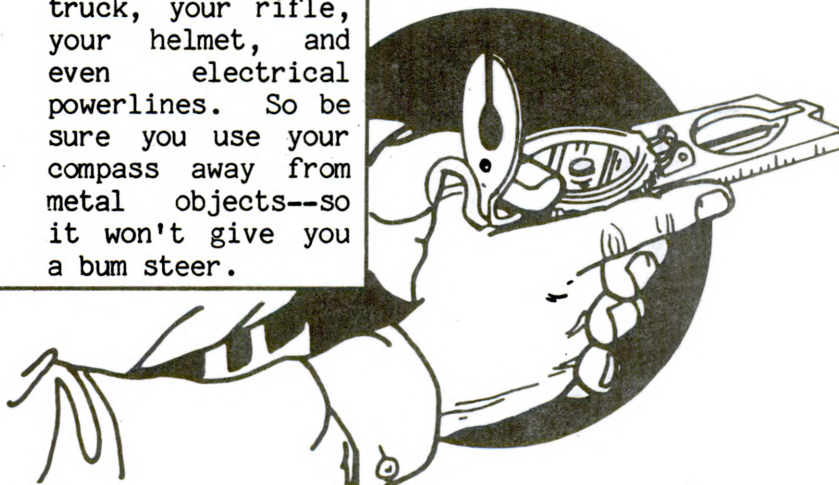
- a. Degrees (red scale)--312°.
- b. Mils (black scale)--5530 mils.

6. If you understand the readings in the example and can apply the center-hold technique of shooting an azimuth, you'll be proficient in performing this task.

How Do You SHOOT An Azimuth?

- ① You use your compass to find or follow an azimuth. The arrow on the compass points towards magnetic north. The arrow is also attracted by any mass of metal--a jeep, truck, your rifle, your helmet, and even electrical powerlines. So be sure you use your compass away from metal objects--so it won't give you a bum steer.

- ② You should use the center-hold technique! it's faster, easier, and more accurate than the old sighting method.



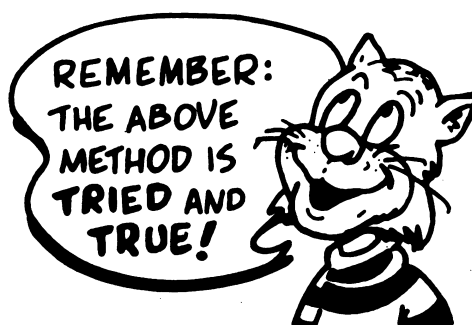
- ③ Open the compass so that the cover forms a straight edge with the base. The lens of the compass is moved out of the way.

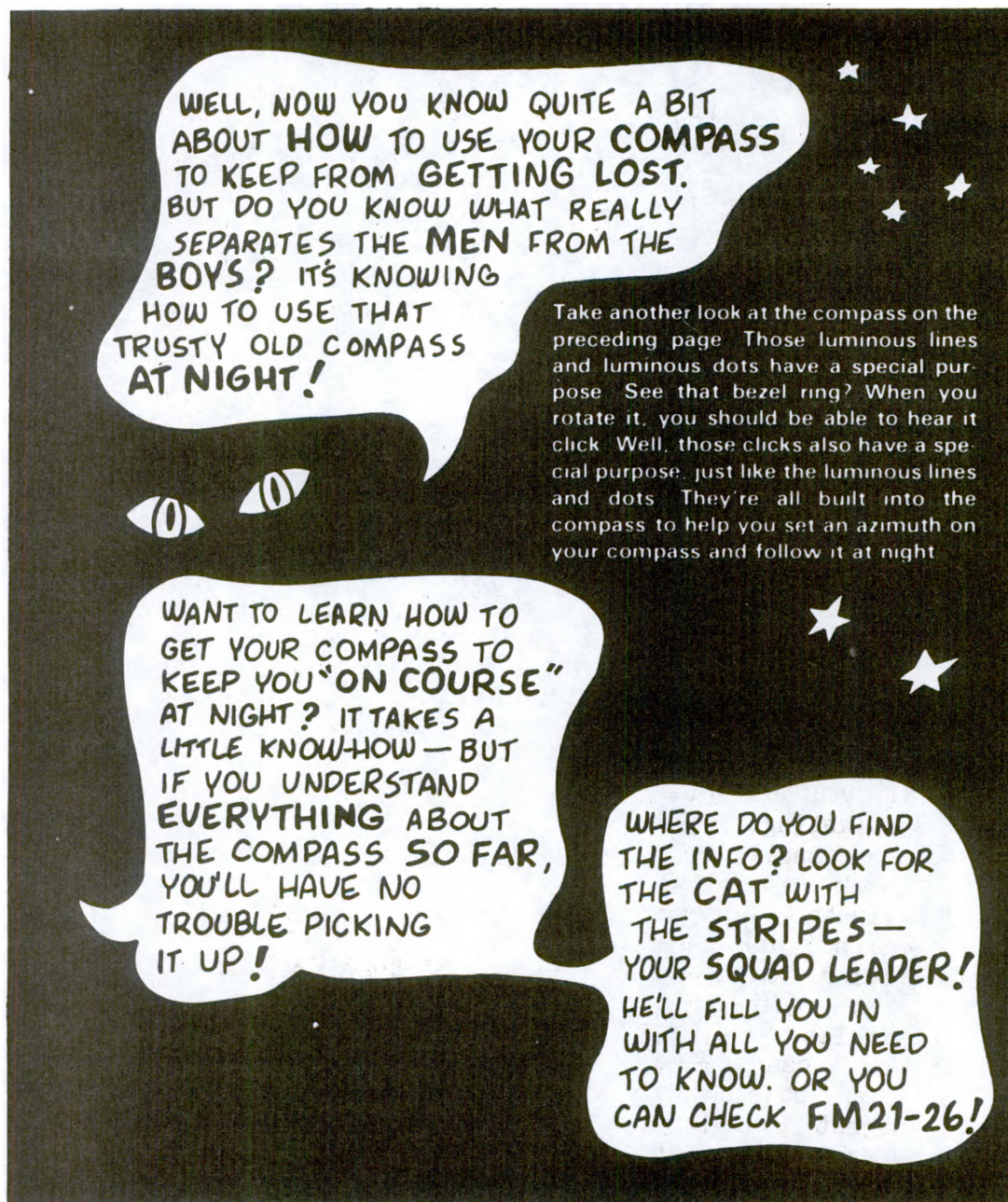
- ④ Next, place your thumb through the thumb loop, form a steady base with your third and fourth fingers, and extend your index finger along the side of the compass.

⑤ Place the thumb of the other hand between the eyepiece and the lens, extend the index finger along the remaining side of the compass and the remaining fingers around the fingers of the other hand, and pull your elbows firmly into your sides. This will place the compass between your chin and your belt.

⑦ If you are land navigating, stop occasionally to check the azimuth along which you are moving to keep from going in circles. Also, you can move from object to object along your path of travel by shooting an azimuth to each object and then moving to that object. Repeating this process while you navigate should keep you "straight"!

⑥ To measure an azimuth, simply turn your entire body toward the object, pointing the compass cover directly at the object. Once you are pointing at the object, just look down and read the azimuth from beneath the fixed black index line. Man, you can even use this method at night!





REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, pages 5-8 thru 5-10, para 5-6)

TEC Lesson 930-071-0017-F, The Lensatic Compass

071-329-1004

DETERMINE THE ELEVATION OF A POINT ON THE
GROUND USING A MAP

CONDITIONS:

Given a standard 1:50,000-scale military map, pencil, a designated point on the map, and a requirement to determine the elevation of that point.

STANDARDS:

Within 1 minute, determine the elevation of the designated point to within one-half of the value of the contour interval.

PERFORMANCE MEASURES:

To determine the elevation of a point on a map:

1. Locate the point on the map. (It may already be plotted on the map, or given as an eight-digit coordinate.)

2. Determine the contour interval of the map from the marginal information.

3. Locate the index contour line nearest the point for which the elevation is being sought.

4. Count the number of contour lines that must be crossed to go from the numbered lines to the point and note direction--"up" or "down."

a. If the point is on contour lines, its elevation is that of the contour.

b. For points between contours:

(1) Points less than one-fourth the distance between lines are considered to be the same as the elevation of the nearest line.

(2) Points one-fourth to three-fourths the distance from the lower line are considered to be at an elevation half the contour interval above the lower line.

c. To estimate elevation of the top of an unmarked hill, add half the contour interval to elevation of highest contour line around the hill.

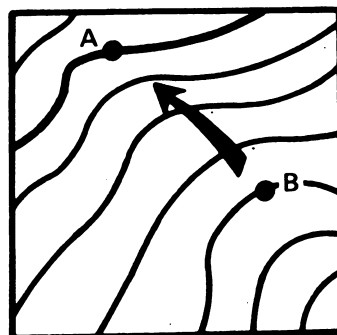
d. To estimate the elevation of the bottom of a depression, subtract half the contour interval from the lowest contour around the depression.

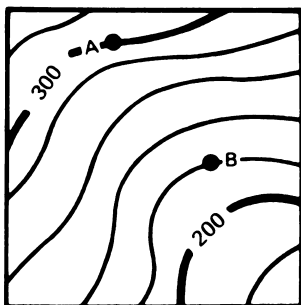
e. On maps that do not show elevation and relief in as much detail as needed, supplementary contour lines may be used. Marginal information indicates the interval, and the supplementary lines are used exactly like solid contour lines.

f. Bench marks and spot elevation also indicate points of known elevation.

...and this is about **CONTOUR LINES**

The brown lines on the map are called CONTOUR lines. Each line shows the height above sea level. Contour lines never cross one another. Printed at the bottom of the map is the CONTOUR INTERVAL, which is the difference in height (elevation) between one brown line and the one next to it. On a map with a scale of 1:50,000, contour interval is usually 20 feet. This would make point A 80 feet higher or lower than point B.





How can you tell from the brown lines whether it's uphill or downhill? Well, every fifth line is heavier than the rest and has a number that gives its elevation. Let's say that the contour interval is 20 feet again. Now, you can tell that point A is 80 feet higher than point B. Also, if you knew the ground distance between A and B, you could get an idea of how steep the slope was.

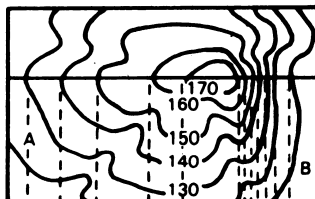


SEE IF YOU CAN FIGURE OUT MY ELEVATION. THE CONTOUR INTERVAL IS 20 FEET. CHECK YOUR ANSWER WITH THE RIGHT ONE BELOW!

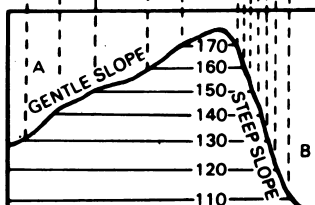


Contour lines widely spaced show a gentle slope. When they are close together the slope is steep.

HILL AS SHOWN ON MAP

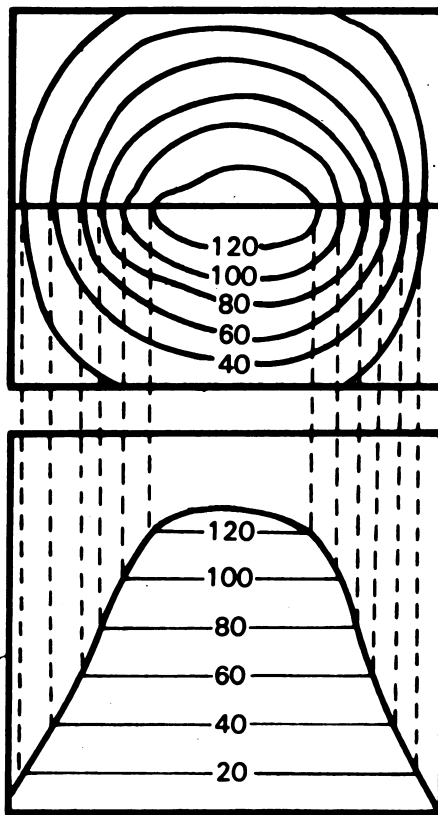
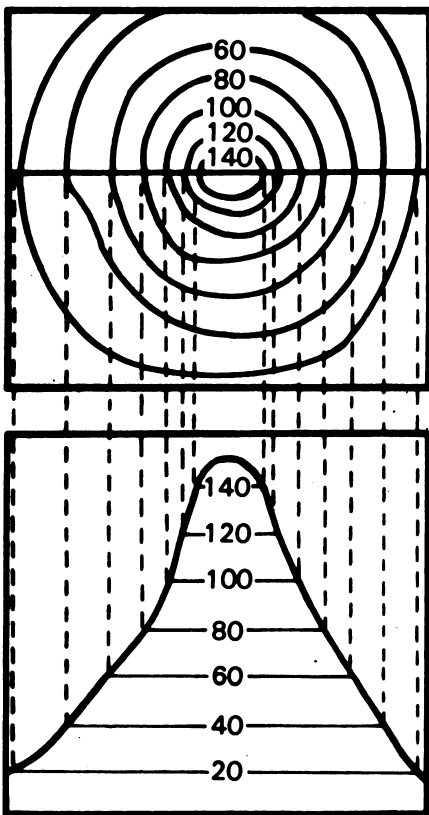


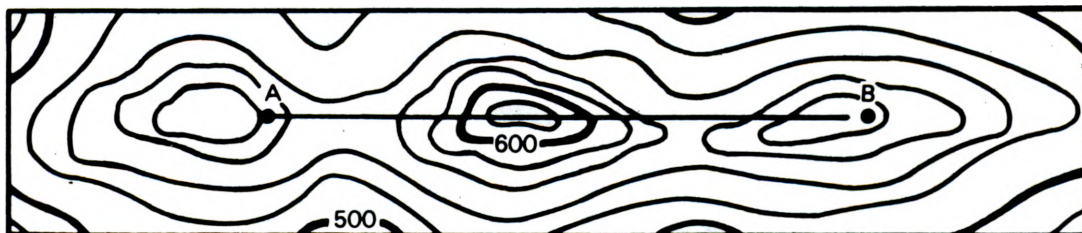
THIS PROJECTED DRAWING SHOWS HOW THE SAME HILL WOULD LOOK FROM THE GROUND! NOTE THAT "A" IS THE "EASY CLIMB" SIDE.



... AND "B" IS THE "SUICIDE"!

When the contour lines are close together at the top of a hill, the hilltop is pointed. The hilltop is flat when the contour lines are widely spaced at the top.





REMEMBER: A contour line is a brown line on your map that connects points of the same elevation. You can find the contour interval in the margin at the bottom of your map. The heavy brown lines (every fifth one) have the elevation printed on them. You can tell from looking at your map what the slopes, hills, and valleys will look like on the ground.

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 6, page 6-1, para 6-2)
TEC Lesson 930-071-0016-F, Terrain Features

FM 31-11C-S

071-329-1005

DETERMINE A LOCATION ON THE GROUND BY
TERRAIN ASSOCIATION

CONDITIONS:

In the field during daylight hours, while at an unknown location on the ground, given a standard 1:50,000-scale military map of the area, a coordinate scale and protractor, a known point on the ground, and a requirement to determine the six-digit map coordinates of the location.

STANDARDS:

Within 15 minutes, determine the six-digit grid coordinates of your location to within 100 meters.

PERFORMANCE MEASURES:

1. Determine the four cardinal directions (north, south, east, and west).
2. Determine the type of terrain feature on which you are located.
3. Determine what types of terrain features surround the location.
4. Orient the map.
5. Relate the terrain features on the ground to those shown on the map.
6. Having determined where the terrain features on the ground and those on the map coincide, determine the coordinate location of that point using the coordinate scale and protractor.

REFERENCE:

TEC Lesson 930-071-0018-F, Land Navigation With a Map and Compass

FM 31-11C-S

071-329-1006

NAVIGATE FROM ONE POSITION ON THE GROUND
TO ANOTHER POINT

CONDITIONS:

Given a standard 1:50,000-scale military map, compass, a coordinate scale and protractor, and designated start and finish points no more than 3,000 meters apart. The field location of the task should appear on the military map and contain varying types of terrain. Weather conditions should not be considered a limiting factor.

STANDARDS:

Within 1 hour, move from the start point to the finish point.

PERFORMANCE MEASURES:

1. Locate the start point and finish point on the map and determine where the start point is on the ground.
2. Determine the grid azimuth from the start point to the finish point on the map.
3. Convert the grid azimuth to a magnetic azimuth.
4. Determine the distance between the start point and the finish point on the map.
5. Convert the map distance to pace count.
6. Place the azimuth between the start point and the finish point under the fixed black index line of the compass.
7. When planning the route between points, select terrain features that will be encountered by making a map reconnaissance.
8. Make a mental checklist of such features.
9. Move to the start point to begin pace count.

FM 31-11C-S

10. While moving along the route, check against your list.

11. After reaching the finish point, conduct a detailed terrain analysis to confirm your location.

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69

TEC Lesson 930-071-0018-F, Land Navigation With a Map and Compass

071-329-1007

DETERMINE DISTANCE WHILE MOVING
BETWEEN TWO POINTS ON THE GROUND

CONDITIONS:

Given a 600-meter pace course, a pace factor conversion table to determine your pace count, and a requirement to move by foot over varying types of terrain during daylight hours in all types of weather from a start point to a finish point not less than 500 meters nor greater than 700 meters in length.

STANDARDS:

Determine the distance between the start point and finish point to within 5 percent of the actual distance in a maximum of 45 minutes.

PERFORMANCE MEASURES:

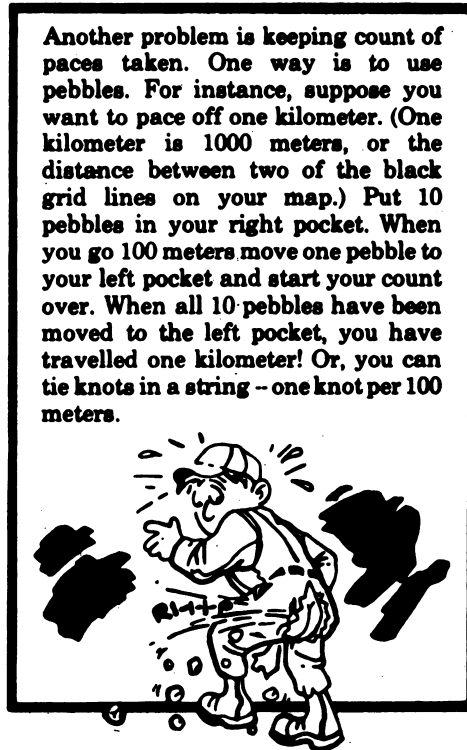
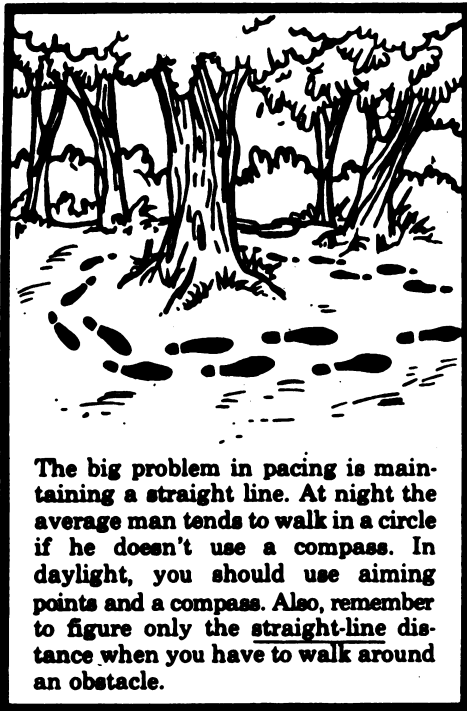
When you have to go a certain distance on foot without any landmarks to guide you, you can measure distance pretty accurately by counting your paces. The average pace is just a little less than 1 meter. The average man uses 116 paces to travel 100 meters. You should check your pace length by practicing on a known 100-meter distance--like a football field plus one end zone, which is 110 yards (pretty close to 100 meters).

BEWARE: When you travel cross country like you do in the field, you use more paces to travel 100 meters--usually about 148 instead of 116. This is because you are not traveling over level ground, and you must use more paces to make up for your movement up and down hills. You should pace yourself over at least 600 meters of cross-country terrain in order to learn how many paces it takes you to travel an average 100 meters over cross-country terrain.

Be sure you know how many paces it take you to walk 100 meters both on level terrain and cross-country.

IF YOU FIND THAT YOU DON'T TAKE
116 PACES IN 100 METERS, FIGURE
OUT HOW MANY PACES YOU DO
TAKE TO GO 100 METERS.





Now, let's work a sample problem.

Problem: You are to move 715 meters.

- a. Your pace count for 100 meters is equal to 116 paces.
- b. Using the pebble method, you will need seven pebbles. This will take you 700 meters. But what about the other 15 meters?
- c. To determine how many paces it will take to go the remaining 15 meters, you simply multiply 15 meters by your pace count (116).

(1) $15 \times 116 = 1740$.

(2) Mark out the last two numbers (40). The remainder is how many paces it will take to go 15 meters (17).

d. So, you would go 715 meters using the pebble method by pacing off 116 paces per 100 meters until all seven pebbles were used, then go an additional 17 paces to arrive at 715 meters.

REMEMBER: When determining your number of paces to go, if it is not a multiple of 100, always multiply the meters remaining by your pace count and mark out the last two numbers in your result.

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69

TEC Lesson 930-071-0018-F, Land Navigation With a Map and Compass

071-329-1008

MEASURE DISTANCE ON MAP

CONDITIONS:

Given:

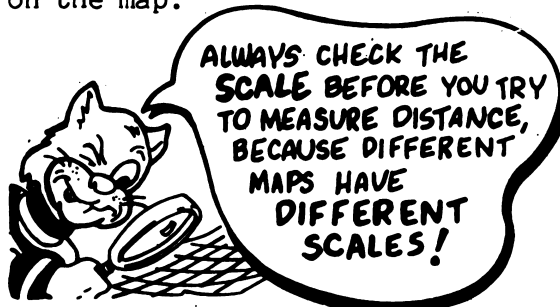
1. A standard 1:50,000-scale topographic map on which is plotted:
 - a. Point A and point B, 3,000 to 4,000 meters apart.
 - b. Point C and point D, 3,000 to 4,000 meters apart, on a road (trail) which changes direction at least twice.
2. A strip of paper with a straight edge.

STANDARDS:

1. Determine the straight-line distance, in meters, from point A to point B within 50 meters in 3 minutes.
2. Determine the road (curved-line) distance from point C to point D within 100 meters in 3 minutes.

PERFORMANCE MEASURES:

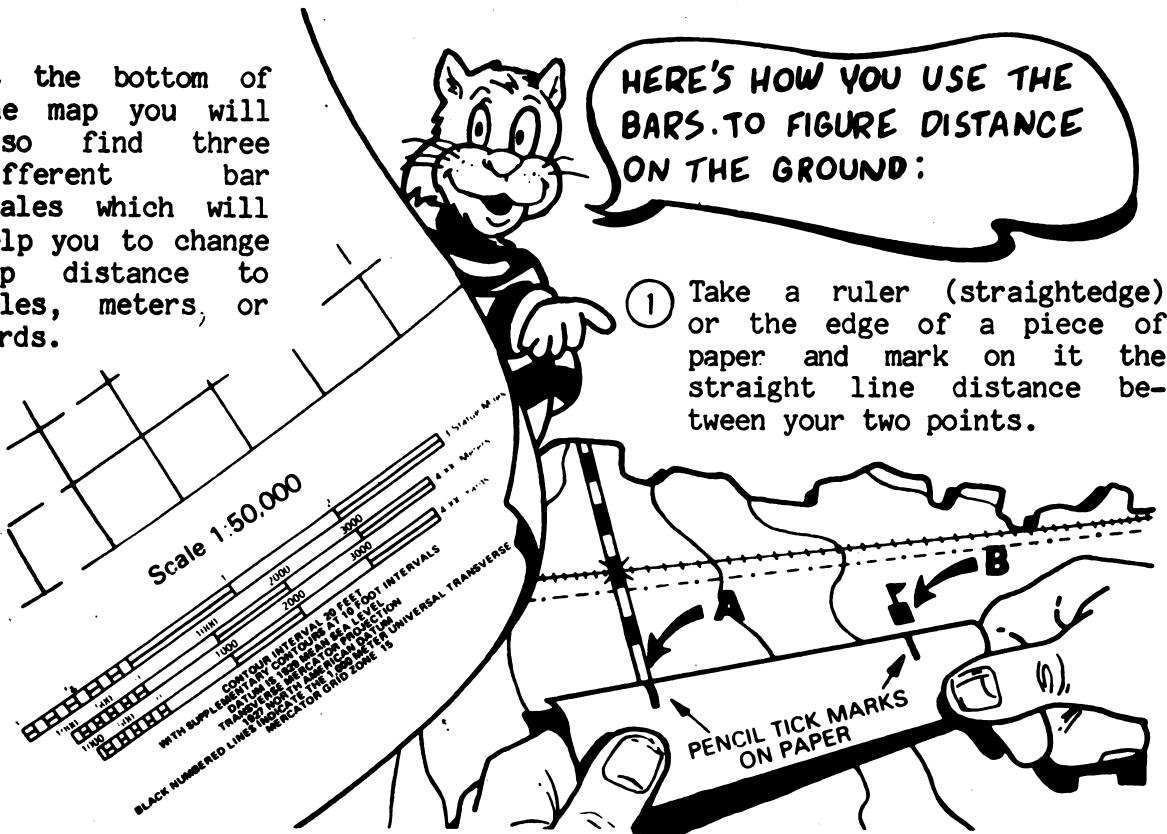
1. You can use your map to measure distance--how far it is between two places. The map is drawn to scale. This means that a certain distance on the map equals a certain distance on the earth. The scale is printed at the bottom and at the top of the map, like this--Scale 1:50,000.
2. This means that 1 inch on the map equals 50,000 inches on the ground. In fact, any ground distance equals 50,000 times that distance on the map.



At the bottom of the map you will also find three different bar scales which will help you to change map distance to miles, meters, or yards.

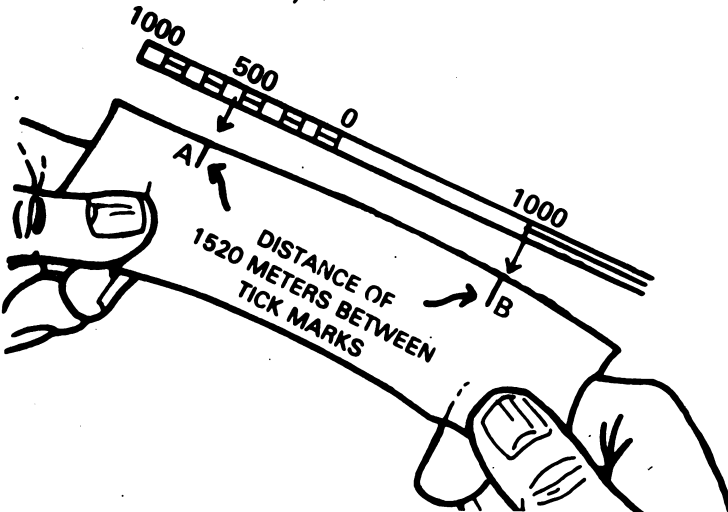
HERE'S HOW YOU USE THE
BARS TO FIGURE DISTANCE
ON THE GROUND:

- ① Take a ruler (straightedge) or the edge of a piece of paper and mark on it the straight line distance between your two points.



- ② Then put the ruler or paper just under one of the bar scales and read the ground distance in miles, meters, or yards. The bar scale in the picture shows a ground distance of 1,520 meters.

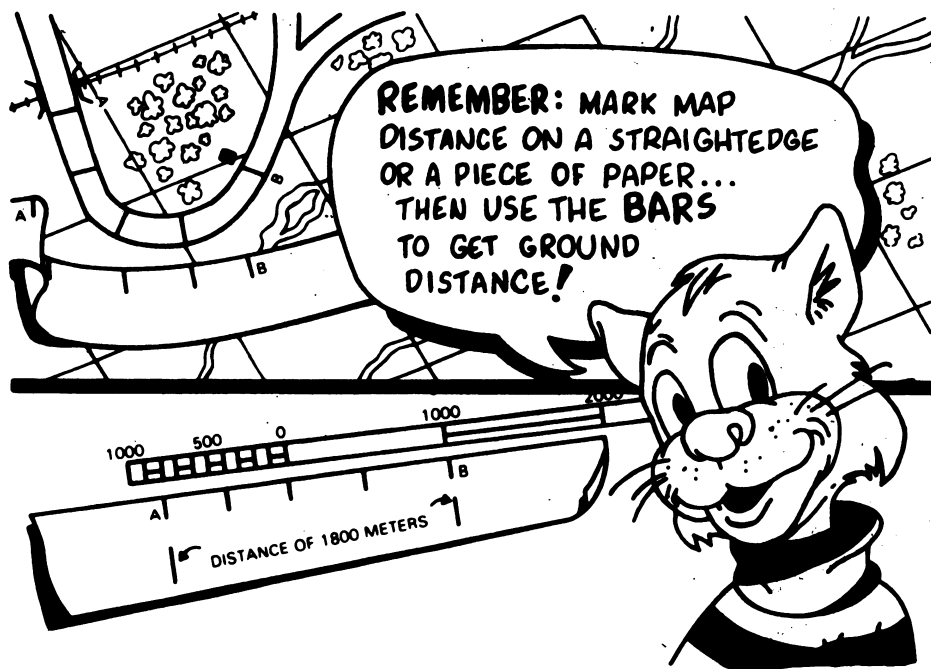
- 3 Suppose you want to find the distance between A and B around the curve in a road. Take a strip of paper, make a small tick mark on it, and line up the tick mark with Point A. Aline the paper with the road edge until you come to the curve, make another mark on the paper and on the map, and then pivot the paper so it continues to follow the road edge. Keep repeating this until you get to Point B. Always follow the road edge with your paper. Mark a mark on your paper where it hits B, and then go to your bar scales to get the distance.



Normally, you will be required to measure distance in meters, and you may receive a problem that goes off the bar scale. The meter bar scale allows you to measure distances up to 5,000 meters. If you have to measure distances greater than 5,000 meters, follow this procedure.

a. Step A. Place your starting point on the paper under the zero on the bar scale. Measure off 4,000 meters and place a new tick mark at that point on your paper.

b. Step B. Place this second tick mark also under the zero on the bar scale and determine if the distance on the paper now falls within the bar scale. If it does, add this value to 4,000 to give you your total distance. If it does not, repeat step A until the distance on the paper falls within the bar scale. Remember to add this last value to the total number of meters you've already measured.



REFERENCE:

FM 21-26, Map Reading, C1, Jan 69 (chap 4, page 4-2, para 4-3)

071-329-1009

CONVERT AZIMUTHS (MAGNETIC OR GRID)

CONDITIONS:

Given a standard 1:50,000-scale military map with a declination diagram, a pencil, and either a magnetic azimuth or a grid azimuth which must be converted.

STANDARDS:

Within 3 minutes, convert the given magnetic azimuth to a grid azimuth (or grid to magnetic) without error.

PERFORMANCE MEASURES:**1. Easterly Grid-Magnetic (G-M) Angle (fig. 1):**

a. To convert a magnetic azimuth to a grid azimuth, add the value of the G-M angle to the magnetic azimuth.

b. To convert a grid azimuth to a magnetic azimuth, subtract the value of the G-M angle from the grid azimuth.

2. Westerly Grid-Magnetic (G-M) Angle (fig. 2):

a. To convert a magnetic azimuth to a grid azimuth, subtract the value of the G-M angle from the magnetic azimuth.

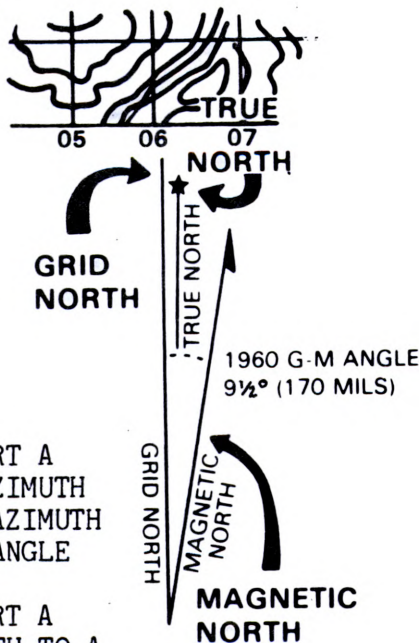
b. To convert a grid azimuth to a magnetic azimuth, add the value of the G-M angle to the grid azimuth.



Figure 1



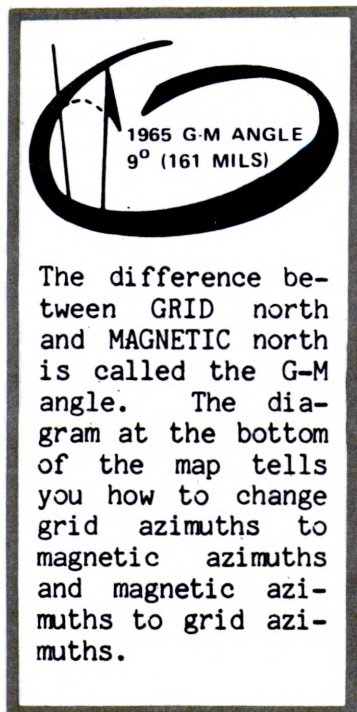
Figure 2



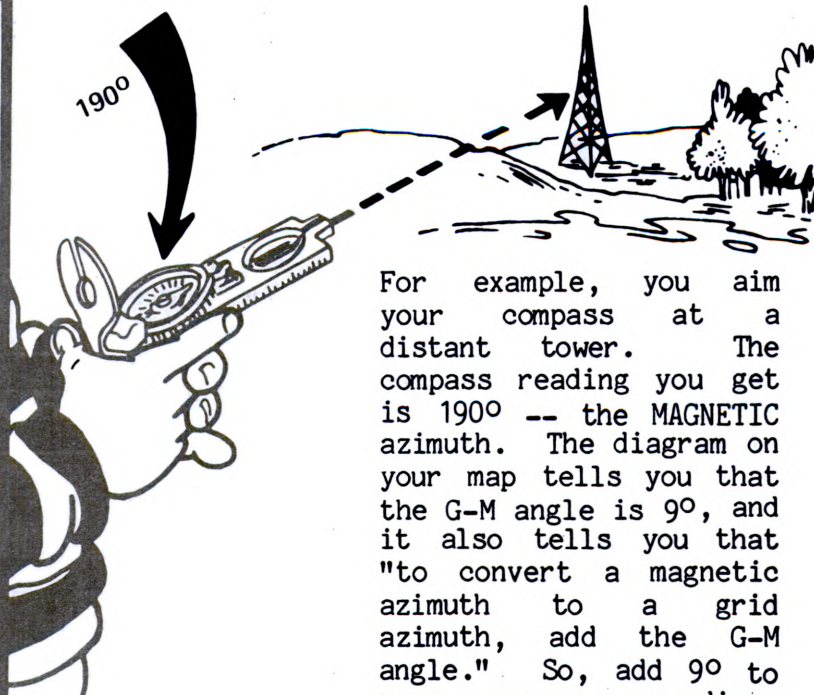
TO CONVERT A
MAGNETIC AZIMUTH
TO A GRID AZIMUTH
ADD G-M ANGLE

TO CONVERT A
GRID AZIMUTH TO A
MAGNETIC AZIMUTH
SUBSTRACT G-M ANGLE

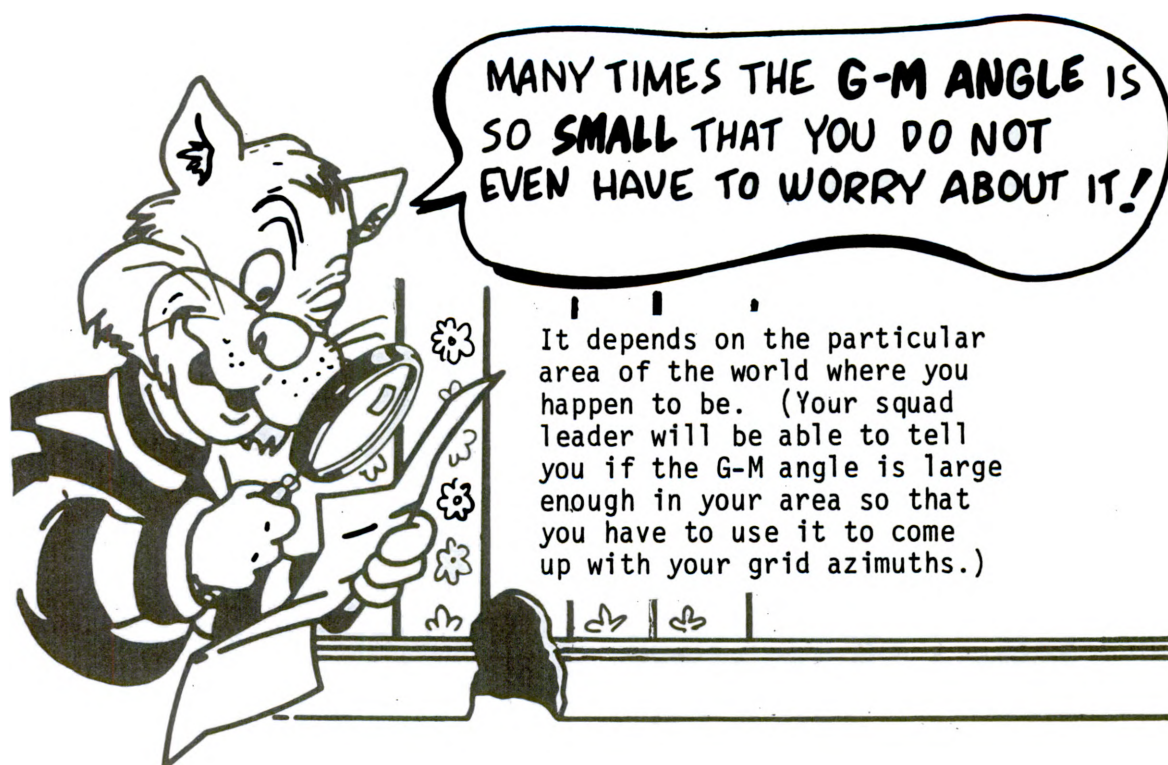
The north-south lines on your map give GRID north. The needle of the compass points to MAGNETIC north. Grid north and magnetic north are usually different by a few degrees. Neither one points straight at the North Pole that's called TRUE north, but you needn't worry about TRUE north to keep from getting lost in a combat area. The difference in degrees for every map is shown at the bottom of the map sheet.



The difference between GRID north and MAGNETIC north is called the G-M angle. The diagram at the bottom of the map tells you how to change grid azimuths to magnetic azimuths and magnetic azimuths to grid azimuths.



For example, you aim your compass at a distant tower. The compass reading you get is 190° -- the MAGNETIC azimuth. The diagram on your map tells you that the G-M angle is 9° , and it also tells you that "to convert a magnetic azimuth to a grid azimuth, add the G-M angle." So, add 9° to your compass reading. This gives you $190 + 9 = 199$. Your grid azimuth is 199° .



REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, pages 5-1 thru 5-6, para 5-3 thru 5-4)
TEC Lesson 930-071-0015-F, Converting Azimuths

071-329-1010

DETERMINE AZIMUTHS USING A COORDINATE
SCALE AND PROTRACTOR

CONDITIONS:

Given a standard 1:50,000-scale military map, two known points plotted on the map, coordinate scale and protractor, a straight-edged object, a pencil, and a requirement to determine the azimuth from your location (point A) to another point (B) on the map.

STANDARDS:

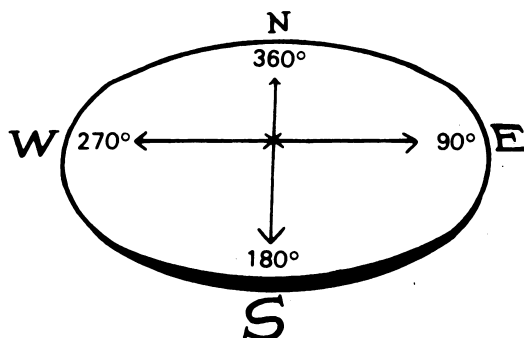
1. Determine the grid azimuth from your location (point A) to point B to within 1° in 3 minutes.
2. Determine the back azimuth of a given azimuth to the exact degree.

PERFORMANCE MEASURES:

1. The direction from one point to another point, either on the map or on the ground, has a military name--

AZIMUTH

2. Azimuths are given in degrees in a clockwise direction. Since there are 360° in a circle, your azimuth can be any number up to 360. Due east is 90° , due south is 180° , due west is 270° , and due north is 360° .



3. To get the right azimuth from a map, you have to use a protractor. Here is how to use your protractor to determine an azimuth:

a. Determine your location (point A) and the location of the other point (B) on the map (see fig. 1).

b. Draw a straight line from point A to point B.

c. Place the index of the protractor over center of mass of point A with the 00 on the protractor at the top and 90° to the right.

d. Start at the 00 point on the protractor and read to the right in a clockwise manner until reaching the point where the straight line intersects the protractor scale.

e. Read the azimuth in degrees from the protractor--210°.

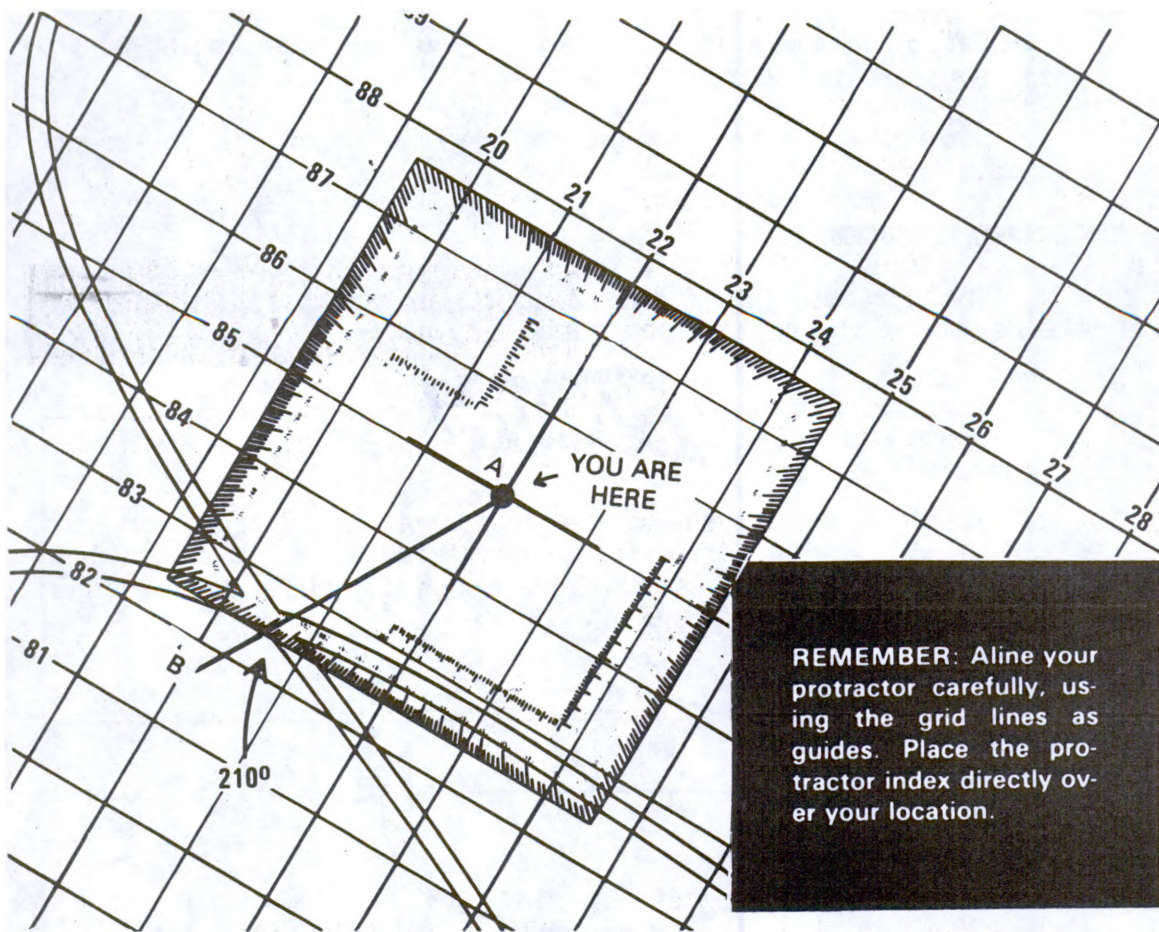


Figure 1

WHEN YOU TURN AROUND COMPLETELY, YOU
TURN BACK 180 DEGREES!



$$\begin{array}{r} 320 \\ -180 \\ \hline 140 \end{array} \quad \begin{array}{r} 60 \\ +180 \\ \hline 240 \end{array}$$

If you can't subtract 180° because your first azimuth is too small, then just add 180°. For example, if your azimuth was 40°, you know that you can't subtract 180°, so you add 180. The back azimuth would be $40 + 180 = 220^\circ$.

Suppose you follow the 210° azimuth in figure 1 to the road junction, and then you want to go back to your original location. To do this, you take a BACK AZIMUTH. You simply subtract 180 from the first azimuth. Your back azimuth is $210 - 180 = 30^\circ$.

$$\begin{array}{r} 210 \\ -180 \\ \hline 30 \end{array} \quad \begin{array}{r} 16 \\ 180 \\ \hline 196 \end{array} \quad \begin{array}{r} 40 \\ +180 \\ \hline 220 \end{array} \quad \begin{array}{r} 190 \\ -180 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 72 \\ +180 \\ \hline 252 \end{array}$$

REMEMBER: A back azimuth goes in the opposite direction from an azimuth.

Can you figure out the back azimuth of 290°?

How about the back azimuth of 75°?

Check your answers with the correct answers listed to the right.

ANSWERS: The back azimuth of 290° is 290 minus 180, which is 110°. The back azimuth of 75° is 75 plus 180, which is 255°.

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69
TEC Lesson 930-071-0014-F, Measuring Distance and Azimuths

FM 31-11C-S

071-329-1011

ORIENT A MAP USING A COMPASS

CONDITIONS:

Given a standard 1:50,000-scale military map and lensatic compass, in a field environment, under daylight conditions.

STANDARDS:

Within 1 minute, orient the map to the ground using a compass so that the north-seeking arrow of the compass is within 3° of the angle shown in the G-M angle of the declination diagram shown on the map.

PERFORMANCE MEASURES:

1. With the map in a horizontal position, the compass is placed parallel to a north-south grid line with the cover side of the compass pointing toward the top of the map. This will place the black index line on the dial of the compass parallel to grid north. Since the needle on the compass points to magnetic north, we have a declination diagram on the face of the compass formed by the index line and the compass needle.

2. Rotate map and compass until the directions of the declination diagram formed by the black index line and the compass needle match the directions shown on the declination diagram printed on the margin of the map. The map is then oriented.

3. If the magnetic north arrow on the map is to the left of grid north, the compass reading will equal the G-M angle (given in the declination diagram). If the magnetic north is to the right of grid north, the compass reading will equal 360° minus the G-M angle.

4. Remember to point the compass north arrow in the same direction as the magnetic north arrow (para 2 above), and the compass reading (equal to the G-M angle or the 360° minus the G-M angle) will be quite apparent.

5. Some maps have a built-in protractor consisting of a pivot point "P" on the south neatline of the map and several degrees of arc along the north neatline of the map. The G-M line is obtained by connecting pivot point "P" with the appropriate value of the G-M angle (taken from the declination diagram) on the arc. The map may then be oriented by placing the compass parallel to this line and rotating the map and compass until the needle point is aligned with the continuous line formed by the index line and the sighting wire. The map is then oriented.

6. An alternate method is to draw a magnetic north line on the map from any N-S and E-W grid line intersection using the protractor. Aline the straightedge of the compass long this magnetic north line and rotate the map and compass together until the north arrow falls beneath the fixed black index line on the compass.

NOTE: If G-M angle is less than 30° , do not line up north arrow.
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REFERENCE:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, page 5-10, para 5-7)

071-329-1012

ORIENT A MAP TO THE GROUND BY
MAP-TERRAIN ASSOCIATION

CONDITIONS:

Given a standard 1:50,000-scale military map in a field site, under daylight conditions.

STANDARDS:

You must orient the map to north within 30° in 10 minutes.

PERFORMANCE MEASURES:

There are many good ways that you can use to locate your position on your map, but first you have to do one important thing.

You've got to point your map so that NORTH, SOUTH, EAST, and WEST on the map POINT THE SAME WAY as they do ON THE GROUND.

Look at the map and the ground to find two linear features common to both, such as hilltops, saddles, valleys, ridges, and depressions. By aligning the features on the map with the same feature on the ground (figs. 1 and 2) the map is oriented.

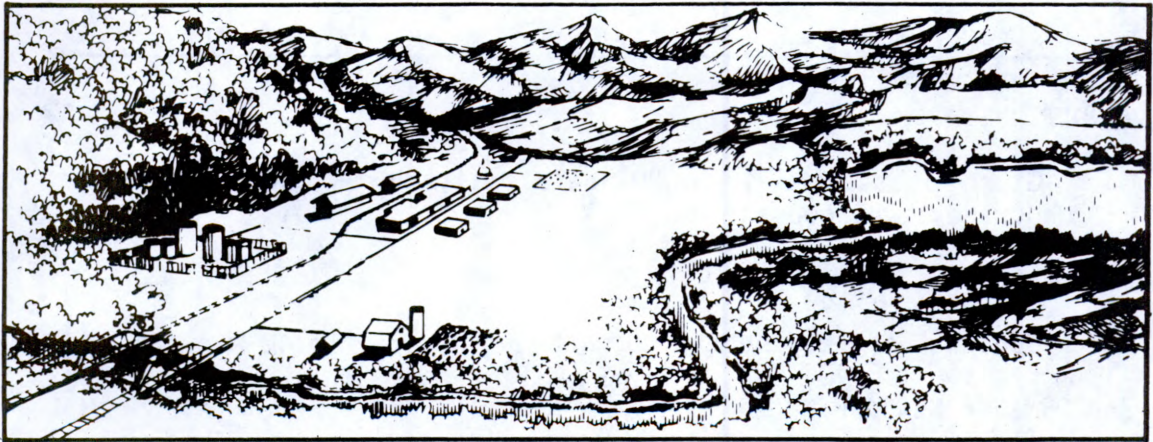


Figure 1. An area as viewed from a ground position.

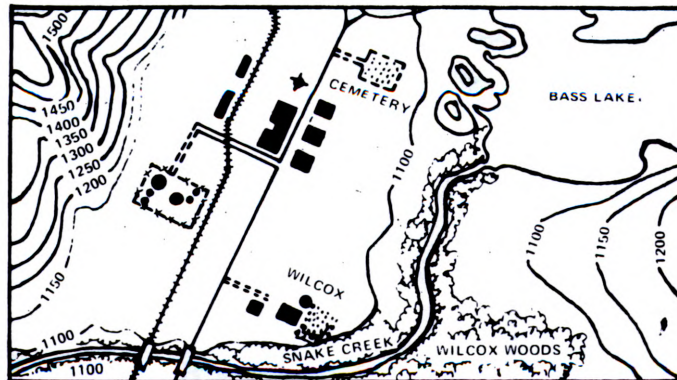


Figure 2. Map of the same area as in figure 1.

REFERENCE:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, page 5-10, para 5-7)

COMPUTE THE BACK AZIMUTH OF AN AZIMUTH

CONDITIONS:

Given a known azimuth, pencil, and paper.

STANDARDS:

Within 1 minute, find the back azimuth of the given azimuth.

PERFORMANCE MEASURES:

The back azimuth of a compass direction differs from its azimuth by exactly 180° . To find the back azimuth of an--

- a. Azimuth of less than 180° , add 180° .
- b. Azimuth of more than 180° , subtract 180° .
- c. Azimuth of 180° , add or subtract 180° (the back azimuth is 0° or 360°).

REFERENCE:

FM 21-26, Map Reading, C1, Jan 69

071-329-1014

LOCATE AN UNKNOWN POINT ON A MAP OR ON THE GROUND BY INTERSECTION

CONDITIONS:

In a field location, given a standard 1:50,000-scale military map of the area, the location of two known points, compass, coordinate scale and protractor, pencil, and an object or terrain feature for which you must determine the location (grid coordinates).

STANDARDS:

Within 7 minutes (15 minutes, if you must measure azimuths), determine the 100,000-meter-square identification letters and six-digit coordinates to within 100 meters.

PERFORMANCE MEASURES:

Intersection is a method used to locate unknown points on a map by intersecting lines from two known points.

For example: A magnetic azimuth from a known observation post (OP) to an unknown point is changed to a grid azimuth and drawn on the map. Another magnetic azimuth from another known OP location to the same unknown point is changed to a grid azimuth and drawn on the same map. Where the lines intersect on the map is the location of the distant point.

1. Map and Compass Method (fig. 1).

NOTE: Map not to scale and an easterly G-M angle of 10° is used.
--

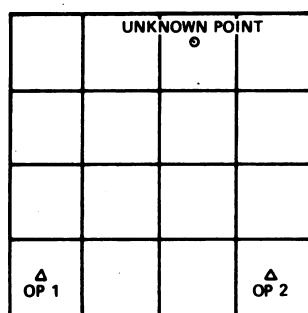
- a. Determine the G-M angle of the map you are using.
- b. Locate and mark your position on the map.
- c. Measure the magnetic azimuth to the unknown point (220°); change it to a grid azimuth. From the magnetic azimuth you found, subtract the G-M angle if it is westerly; add if it is easterly. In the example, the G-M angle used was 10° easterly.

d. Place the protractor on the map, insuring that the 00 indicator on the protractor is pointing to the top of the map (north) and the index point is placed center mass on your location (fig. 1). Place a tick mark on the number of degrees you want to plot. Draw a line on the map from your position on this grid azimuth (32°).

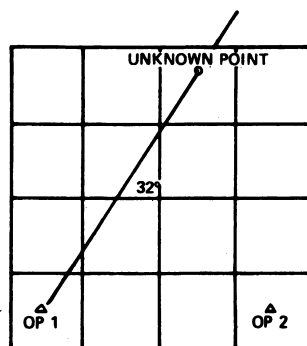
e. Move to or call a second known position from which the unknown point can be seen. Locate this position on the map.

f. Repeat paragraphs c and d above.

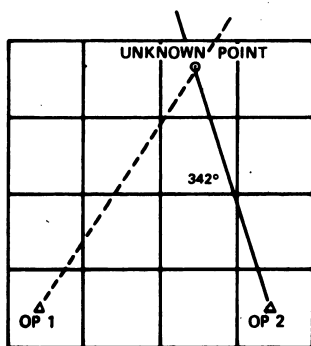
g. Where the lines cross is the location of the unknown point.



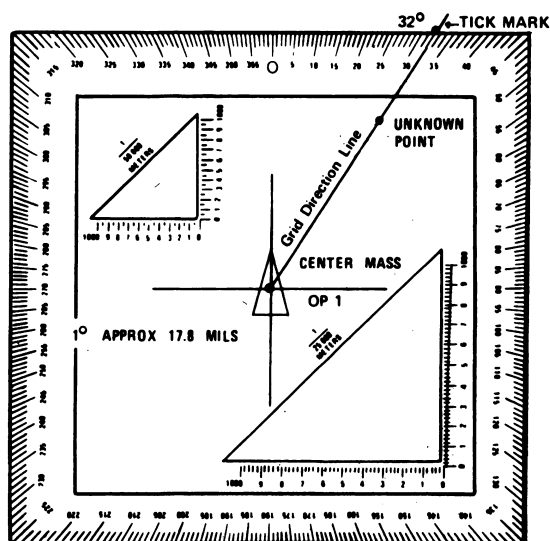
A.



B.



C.



D.

Figure 1. Intersection using map and compass method.

2. Straightedge Method (When No Compass Is Available) (fig. 2).

a. (See task number 071-329-1012, Orient a Map to the Ground by Map-Terrain Association.)

b. Locate and mark your position on the map.

c. Lay a straightedge on the map with one end at user's position (A) as a pivot point and rotate the straightedge until the unknown point is sighted along the edge.

d. Draw a line along the straightedge.

e. Repeat the above procedure at position B and for a check on accuracy at a third position.

f. The intersection is the location of the unknown point (C).

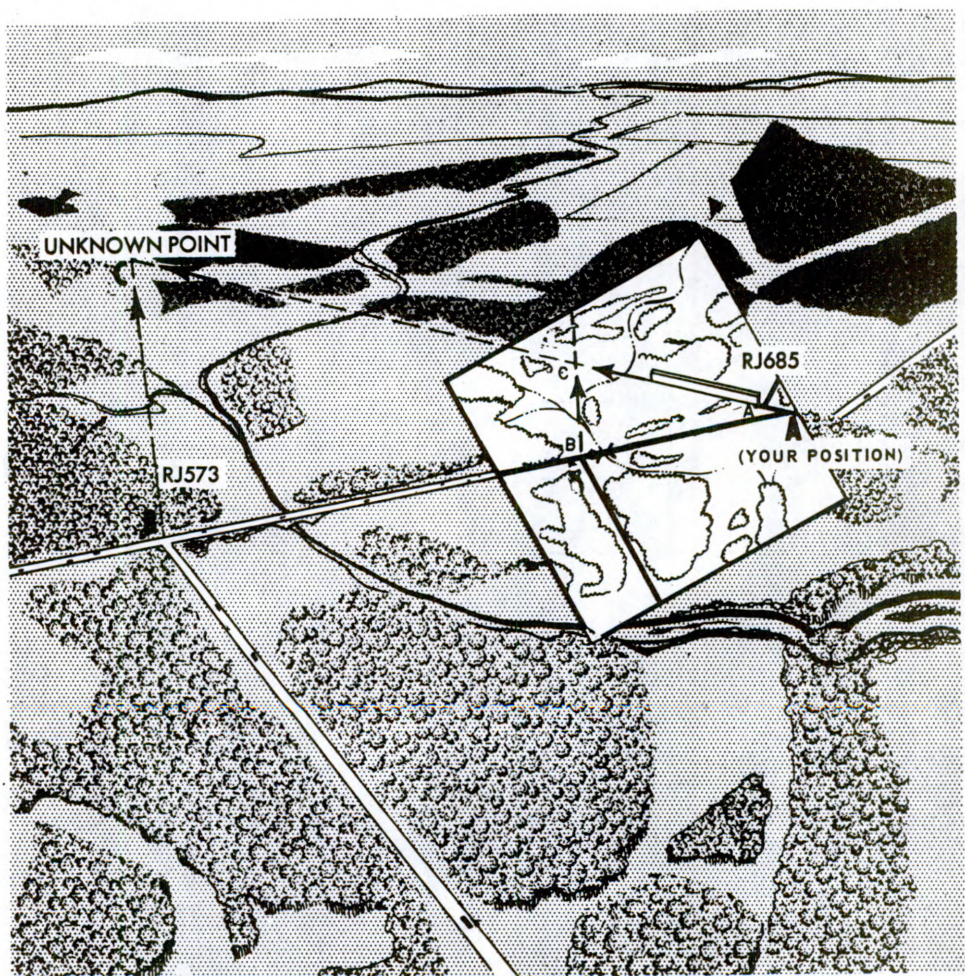


Figure 2. Intersection without compass.

FM 31-11C-S

REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, page 5-14, para 5-9)
TEC Lesson 930-071-0018-F, Land Navigation With a Map and Compass

071-329-1015

LOCATE AN UNKNOWN POINT ON A MAP
OR ON THE GROUND BY RESECTION

CONDITIONS:

In a field at an unknown location, given a standard 1:50,000-scale military map of the area, a compass, straightedge, coordinate scale and protractor, pencil, and two terrain features visible from your location and identifiable on the map.

STANDARDS:

Within 10 minutes, determine the 100,000-meter-square identification letters and six-digit coordinates of your location to within 100 meters of the actual grid coordinates.

PERFORMANCE MEASURES:

RESECTION is a way to locate one's position on a map. Magnetic azimuths are measured to two points on the ground which can be identified on the map. These magnetic azimuths are changed to grid azimuths, and the back azimuths are drawn from the known points on the map. Where these two/three lines resect (cross) is your location.

Map and Compass Method (fig. 1).

NOTE: A 10° easterly G-M angle is used in the examples. Map not to scale.

STEP 1: Determine the G-M angle of the map that you are using.

STEP 2: Locate two known positions on the ground and mark them on your map (fig. 1a).

STEP 3: Measure the magnetic azimuth to one of the known locations; change this to a grid azimuth (fig. 1b).

a. If it is a westerly G-M angle, subtract the number of degrees in the G-M angle to your magnetic azimuth.

b. If it is an easterly G-M angle, add the number of degrees in the G-M angle to your magnetic azimuth.

STEP 4: Change this grid azimuth to a back azimuth.

STEP 5: Place the protractor on the map insuring that the 0° indicator on the protractor is pointing to the top of the map (north) and the index point is placed center mass on this location. Place a tick mark on the number of degrees you want to plot. Remove protractor from the map and draw a line on the map from this position on the grid back azimuth you found, in the direction of your unknown position.

STEP 6: Repeat steps 3 through 5 for a second and third known position (figs. 1c and 1d).

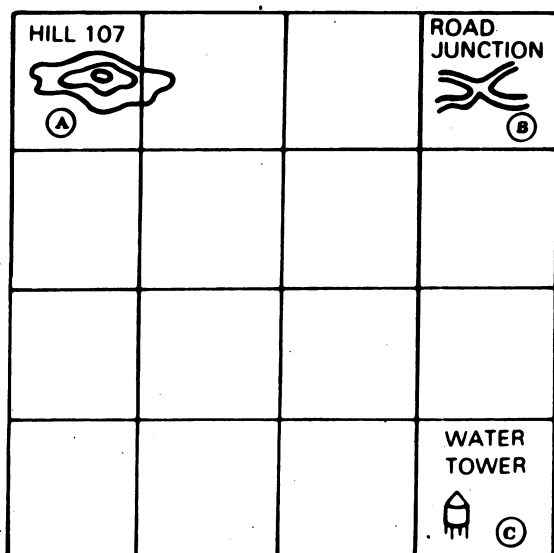


Figure 1a

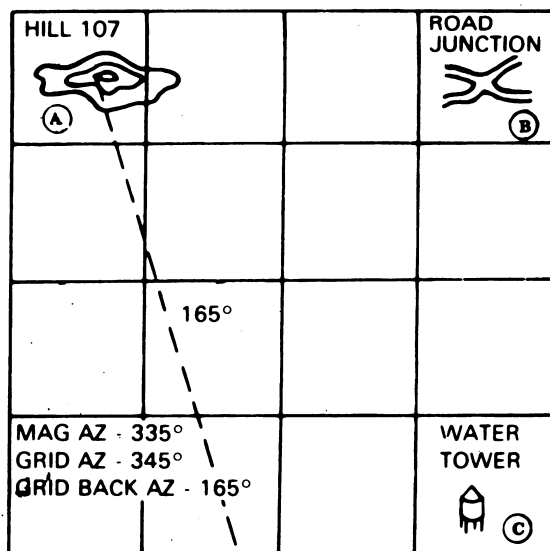


Figure 1b

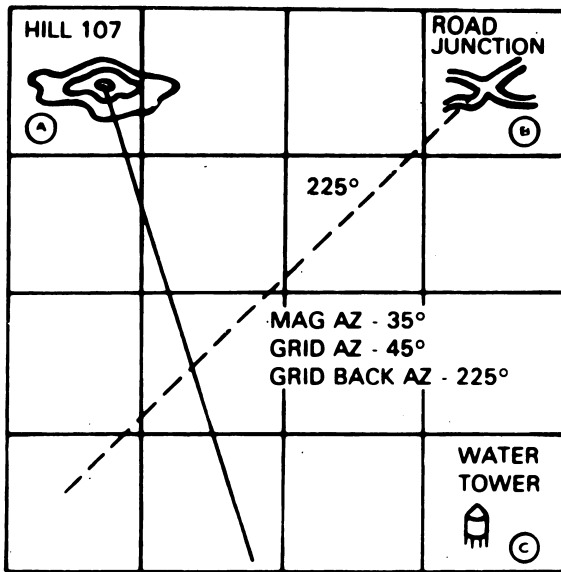


Figure 1c

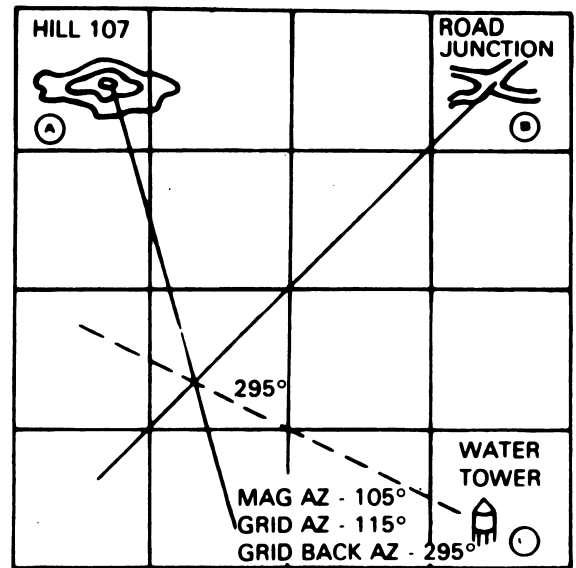
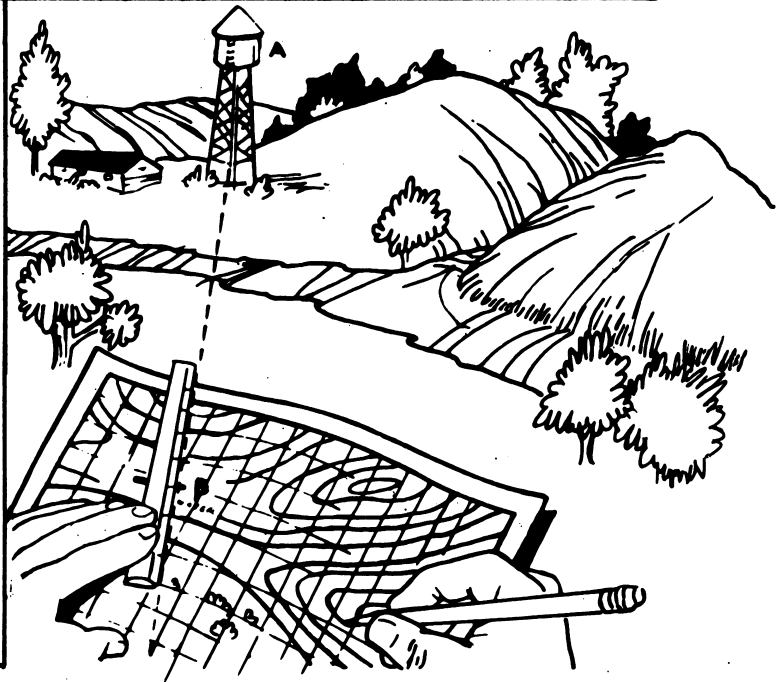


Figure 1d

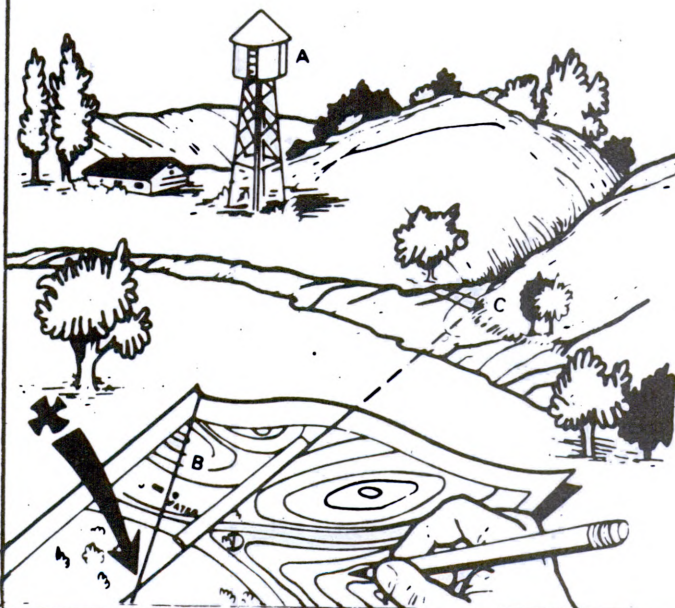
Figure 1

RESECTION WITHOUT A COMPASS

Orient your map as closely as you can using one of the ways you've learned about finding direction--compass, sun watch, or stars. Then, look for some feature--like a water tower (A)--that you can also find on the map. Put a ruler or straightedge on the map and place its edge right next to the water tower symbol (B) on the map. Then, aline the straightedge so that it points exactly at the real water tower. Draw a line along the ruler (the line will cross the symbol for the water tower on your map).



Next, find another feature--like a road junction--and do the same thing. Lay the straight-edge on your map and point it at the real road junction (C), while at the same time its edge crosses over the road junction (D) on the map. Draw another line along the ruler until it crosses (intersects) the first line. The point where the lines cross is your location (X). If you do the same thing with a third line, it may help locate your position more accurately.



REMEMBER: Don't move your map once you've got it properly oriented.

MODIFIED RESECTION

First orient your map, then find some feature that you can also find on the map, such as the water tower in the previous example. Just like before, put a straightedge through the water tower. Draw a line along the ruler. The point where the line crosses the linear feature which you know you are on (road, riverbank, etc.) is your location.

REMEMBER: ALWAYS ORIENT YOUR MAP AS CLOSELY AS YOU CAN. THE COMPASS IS THE BEST WAY. IF YOU DON'T HAVE A REGULAR STRAIGHTEDGE, USE YOUR RIFLE CLEANING ROD, A SECTION OF RADIO ANTENNA, OR EVEN THE EDGE OF A C-RATION BOX!



REFERENCES:

FM 21-26, Map Reading, C1, Jan 69 (chap 5, page 5-10)
TEC Lesson 930-071-0018-F, Land Navigation with a Map and Compass

071-331-0001

MOVE AS A MEMBER OF A PATROL

CONDITIONS:

During daylight or darkness in a field environment, you are required to function as a member of a combat or reconnaissance patrol. You are equipped with your individual weapon, load bearing equipment, poncho, soft cap, and other special equipment as directed by the patrol leader.

STANDARDS:

Move as a member of a patrol in accordance with guidance given in the performance measures so that you--

1. Are not easily seen or heard during movement.
2. Properly demonstrate the techniques of using rally points, crossing danger areas, and passing up the count.
3. Remain appropriately alert and sensitive to enemy presence at all times.

PERFORMANCE MEASURES:

1. Stealth. As a member of a patrol, it is extremely important that you be able to move across the terrain unseen and unheard both day and night. Use the following techniques to help maximize stealth on patrol:

a. Camouflage and conceal yourself as discussed in task number 051-202-1001.

b. Tie down, wrap, tape, or otherwise secure personal equipment so that it makes no sound when you walk or run. Such items as dog tags, loose change, bayonets, magazines, and weapon sling keepers are notorious noisemakers. Check out your dress by jumping up and down and listening for rattles, metal-to-metal contact, etc.

c. Wear soft, well-fitting clothes. Loose, baggy clothes will swish and snag easily as you move. Steel pots and rain gear are particularly noisy when you are moving through dense terrain.

d. Practice soundless movement when walking or crawling. Be concerned about the placement of your feet to avoid snapping twigs or rustling leaves. Step around underbush rather than pushing through branches thereby making noise and possible problems for following soldiers.

e. Avoid extremely dense or steep terrain where you know stealth will be difficult or impossible to maintain.

f. During night movement it becomes essential that you use your sense of touch to identify obstacles and avoid them. Feel forward with your free hand or lead foot to sense low hanging branches, holes, stumps, etc. Pass on a quiet warning of obstacles to following soldiers.

2. Rally Points. In the operation order and during movement, the patrol leader will often designate rally points along the route. These are easily recognizable (by day and night) terrain locations which are used as planned assembly points for members of the patrol. When a rally point is designated, you must--

a. Memorize its location and be prepared to move independently to that location should you become separated from the remainder of the patrol.

b. Pass on the rally point location to other members of the patrol as necessary.

c. Conduct actions at the rally point according to your standard operating procedure or specific guidance provided by the patrol leader in his order. Normally, the senior man returning to a rally point will take charge of the patrol in the absence of the patrol leader.

3. Danger Areas. You must recognize, stop, and report terrain locations where your patrol will be particularly vulnerable to enemy direct fire, mines, or booby traps.

a. Examples of these locations are--

(1) Suspected enemy positions.

(2) Fields or other large open areas.

(3) Linear obstacles such as roads, streams, fences, trails, etc.

(4) Built-up areas.

b. Avoid these areas when possible. If it is mission essential to cross such areas, apply the following techniques:

(1) Recon and secure the near side, flanks, and far side (in that order).

(2) Provide overwatching fires to other members of the patrol as they cross.

(3) Cross as cautiously and quickly as possible.

(4) Remove evidence of your crossing, such as footprints.

(5) Be prepared to move to near or far side rally points should your patrol be taken under fire when crossing.

4. Passing Up the Count. During limited visibility movement, this technique is used by the patrol leader to insure that all patrol members are present. Members of the patrol count off quietly from rear to front at periodic intervals (usually after crossing an obstacle or crossing other difficult terrain). You should listen for the following soldier's count and pass it quietly along to the soldier in front of you adding one to the count. Often, you will have to get your buddy's attention by touching him prior to whispering the count.

5. Be Alert. Make maximum use of all your senses to provide early warning of possible danger or enemy presence.

a. Constantly watch the terrain to your front, flanks, and rear for signs of movement and other unnatural terrain characteristics. See the enemy before he sees you.

b. Be attuned to the sounds of your environment and recognize other sounds which do not fit the general pattern.

c. Be sensitive to tripwires and other booby traps so that you can react to avoid them.

d. Sense any unusual odors in the air, such as smoke, food, etc.

FM 31-11CXS

REFERENCE:

FM 21-75, Combat Training of the Individual Soldier and Patrolling,
Jul 67

071-331-0002

CONDUCT A LOCAL SECURITY PATROL

CONDITIONS:

You will be given a squad or fire team with TOE weapons and equipment and a mission to conduct a local security patrol. (Mission will specify departure and return times and exact locations to be reconnoitered.)

STANDARDS:

IAW the guidance given in the performance measures, conduct a local security patrol so that--

1. Patrol is organized, briefed, and equipped as necessary.
2. Patrol plan is developed and executed to meet the mission requirements.

PERFORMANCE MEASURES:

1. General. The most common type of patrol mission for the fire team or squad is to provide local security by reconnoitering avenues of approach, gaps between units, and areas that cannot be observed because of dead space. This prevents the enemy from infiltrating friendly positions and launching surprise attacks.
2. Planning and Preparation.

NOTE: Planning steps to be followed are as outlined in task number 071-331-0003, Plan a Patrol.

a. Mission. The unit commander will normally designate the routes and specific areas to be checked by the patrol. The mission guidance will usually provide the patrol with friendly direct and indirect fire support throughout its movement. The local security mission will cause the patrol to avoid contact when possible and limit its actions to watching for and reporting enemy or terrain information.

b. Organization (fig. 1). Because of the limited range and firepower requirement of this type patrol, the number of personnel involved is kept to a minimum (squad or fire team). Element and team organization may be modified as mission and personnel constraints dictate.

(1) General organization. Patrol will consist of a headquarters, a recon, and a security element.

(2) Special organization. Because of the simplicity and limited personnel involved in the patrol, special teams will be minimized. Special support such as demolitions, aid/litter, or PW teams can readily be provided by the nearby friendly unit should they be required.

c. Selection of men, weapons, and equipment. Maintenance of unit integrity will be the principal consideration in personnel selection. The patrol leader will usually take the men of the squad or team who are physically qualified and available. Special skill personnel will be provided by the unit commander if he assigns a mission requiring them. Individual weapons and equipment will be carried in accordance with normal patrol procedures.

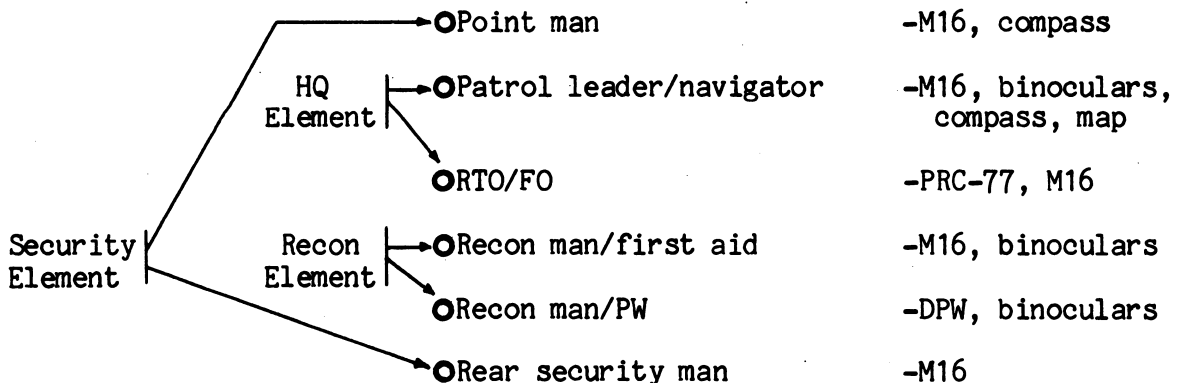
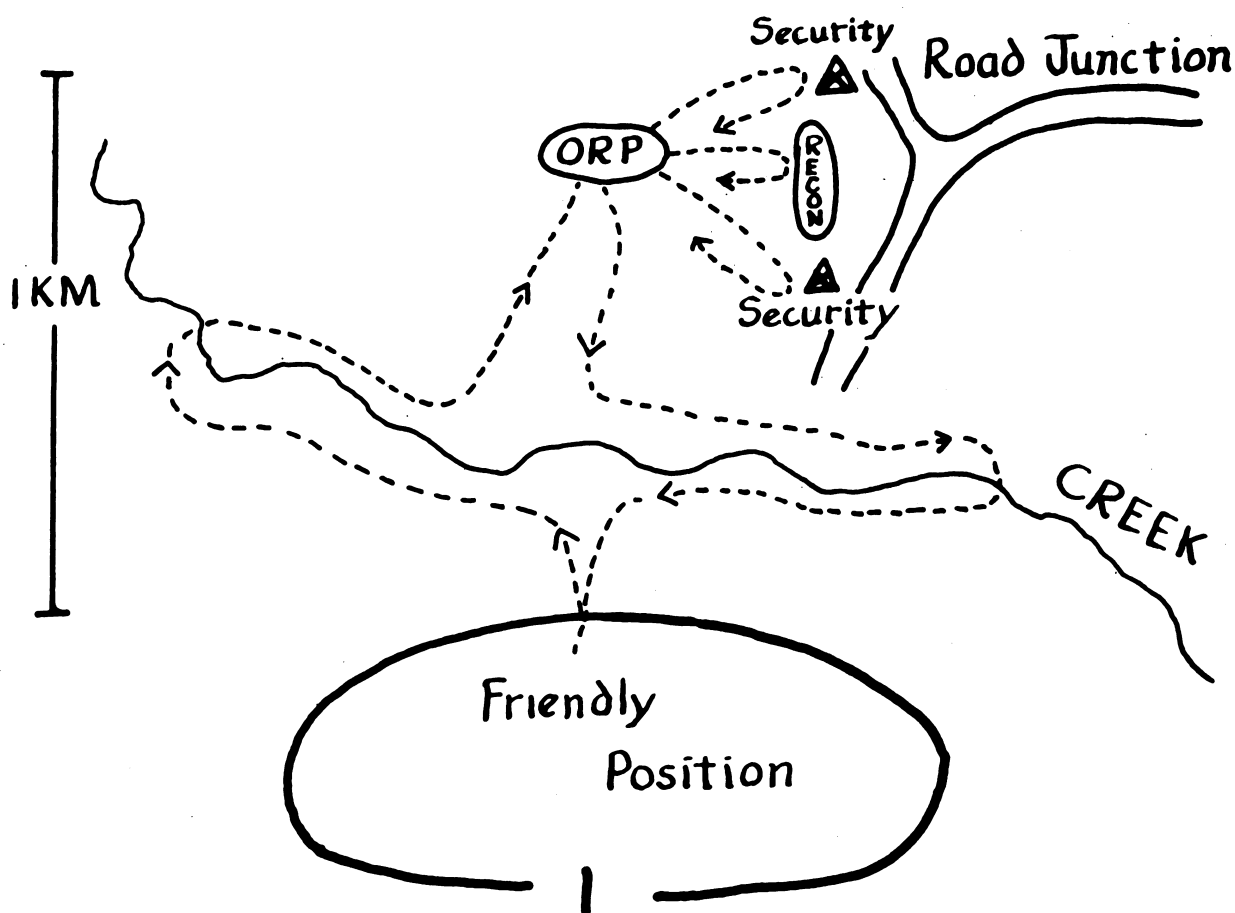


Figure 1. Example local security patrol organization.

d. Patrol plan. The patrol leader must tailor his scheme of maneuver to meet mission requirements. The standard area and zone patrolling techniques may be used or modified as necessary. For example, the patrol leader is given the mission of checking out the dead space along a creekbed to the front of the friendly position and to monitor activity at a road junction. Additionally, he is to look for signs of any enemy activity in the local area. The patrol leader might select a movement route as follows:



e. Contingency plans. Because of the limited strength and firepower of his patrol, the local security patrol leader must be extremely careful in dealing with enemy contact. The patrol must maximize its stealth and avoid or break contact when possible. Support from nearby friendly forces should be on standby to provide emergency reaction. Occasionally, the patrol might conduct a hasty ambush if the enemy strength is small and surprise and firepower superiority are assured. Such an ambush will normally be conducted only after reporting "SALUTE" information to the higher headquarters and instruction to ambush is returned.

REFERENCES:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (chap 6, sec I, page 6-7)

071-331-0003

PLAN A PATROL

CONDITIONS:

You will be given a mission to conduct a reconnaissance or combat patrol; sufficient unit personnel to accomplish the mission; all their TOE weapons and equipment; and a requirement to plan, coordinate, and supervise the preparation of the patrol.

STANDARDS:

IAW guidance given in the performance measures--

1. Plan and use available time to accomplish the preparation of the patrol prior to specified departure time.
2. Develop a plan that specifies who, what, when, where, and how the patrol is to be conducted.
3. Issue a warning and operation order.
4. Supervise the preparation of the patrol to include inspection and rehearsal.

PERFORMANCE MEASURES:

Upon receipt of a mission to conduct a patrol, the patrol leader should accomplish the following actions (not necessarily in sequence):

1. Study the Mission. Develop a clear understanding of exactly what is to be accomplished by the patrol. For example, you are given the mission "Conduct an ambush patrol vic EN 134295 commencing 2400 tonight, return NLT 0500 tomorrow." Based on your analysis of the mission you realize that you must accomplish the following tasks:

- a. Passage of lines both upon exit and reentry of the friendly perimeter.
- b. Cross a river.

c. Set up an ambush.

2. Plan Use of Time. Make a mental or written schedule which allots time for each action to be accomplished by the patrol. Use the reverse planning sequence in which you start by allotting time to the last action to be accomplished by the patrol and work back to the time of receipt of your mission. For example:

- 0200 - - Return friendly area.
- 2330 - 0200 - Movement en route.
- 2300 - 2330 - Accomplish mission, reorganize.
- 2230 - 2300 - Leader's recon.
- 2000 - 2230 - Movement en route.
- 2000 - - Depart friendly area.
- 1945 - 2000 - Movement to departure area.
- 1930 - 1945 - Final inspection.
- 1845 - 1930 - Night rehearsals.
- 1800 - 1845 - Day rehearsals.
- 1745 - 1800 - Inspection.
- 1700 - 1745 - Supper meal.
- 1630 - 1700 - Issue patrol order.
- 1530 - 1630 - Complete detailed plans.
- 1430 - 1530 - Make reconnaissance.
- 1415 - 1430 - Issue warning order.
- 1330 - 1415 - Preliminary planning.
- Coordinate.
- Select men, weapons, equipment.
- Organize the patrol.
- Study terrain and situation.
- Plan use of time.
- Study the mission.
- 1330 - Operation order received.

3. Study Terrain and Situation. During this analysis, the patrol leader identifies the critical factors which will influence his selection of a plan to accomplish the mission.

a. Terrain. Using a map, sketch, or aerial photograph, the patrol leader studies the terrain over which he must move the patrol for the following key elements (OCOKA):

- (1) Observation and fields of fire.
- (2) Cover and concealment.
- (3) Obstacles.
- (4) Key terrain.
- (5) Avenues of approach.

b. Situation. The patrol leader studies the strengths, locations, dispositions, and capabilities of both friendly and enemy forces that may affect the patrol's operation. This analysis will enable the leader to plan routes more effectively, identify special personnel and equipment requirements, and understand the overall risks involved.

4. Organize the Patrol. Based on the previous analysis, the patrol leader determines the elements and teams that will be required to accomplish the mission. This organization is a two-step process--general organization and special organization.

a. General organization. This is the identification of the specific major elements that will be required. In addition to a patrol headquarters, the patrol leader will decide what reconnaissance, security, support, and assault elements he needs to do the job. This organization will vary depending on the type patrol to be conducted. (For specific guidelines on various patrol organizations, refer to the tasks dealing with the type patrol desired.)

b. Special organization. This is the identification of the specific teams which will be part of each major element in the general organization. Depending on the mission and type patrol, the patrol leader will decide what types and how many assault, support, search, demo, and PW teams he needs.

5. Select Men, Weapons, and Equipment. The patrol leader must decide what he needs to get the job done.

a. Men. Identify the special skills needed while on the patrol. Consider taking along an aidman, RTO, FO, demolition specialist, etc. Insure the men are healthy and physically qualified, and maintain unit integrity when possible.

b. Weapons. Take what is necessary to meet the threat and accomplish the mission. Insure men are qualified on the weapons they carry. Often it might be impractical to carry "nice to have" weapons because of the weight and ammunition requirements.

c. Equipment. Consider carrying the following types of equipment:

(1) Routine equipment. This is the basic equipment worn or carried by all patrol members.

(2) Objective area equipment. Equipment needed at the objective such as demolitions, ropes, grenades, etc.

(3) En route equipment. This is what you will use to move to and return from the objective such as maps, binoculars, flashlights, boats, ropes, etc.

(4) Control equipment. This includes whistles, pyrotechnics, radios, etc.

(5) Water and food. Each man should carry water. Rations will be dependent on the anticipated length of the patrol.

6. Issue a Warning Order. This preliminary order gives subordinate leaders and members of the patrol a chance to make preparations while the patrol leader continues his planning and coordination. A warning order follows the following outline.

PATROL WARNING ORDER

The patrol warning order consists of the following:

- a. A brief statement of the situation.
- b. Mission of the patrol.
- c. General instructions:
 - (1) General and special organization.
 - (2) Uniform and equipment common to all.
 - (3) Weapons, ammunition, and equipment.
 - (4) Chain of command.
 - (5) A time schedule for the patrol's guidance.
 - (6) Time, place, uniform, and equipment for receiving the patrol order.
 - (7) Times and places for inspections and rehearsals.
- d. Specific instructions:
 - (1) To subordinate leaders.
 - (2) To special purpose teams or key individuals.

Give the warning order as early as possible to provide maximum advance warning and preparation time to subordinates.

7. Coordinate (Continuous Throughout). The patrol leader must insure that coordination has been effected with all agencies external to the patrol which might influence or be influenced by the actions of the patrol. Examples of coordination that must be made are--

a. Friendly unit. Coordinate the specifics of your entry and exit of friendly lines with the unit involved. Also, inform other units near or through which you might be moving to insure that you will not be delayed or accidentally taken under fire.

b. Fire support. Check on utilization of all available direct and indirect fires which might be available to protect or otherwise assist mission accomplishment.

8. Make Reconnaissance. Visual reconnaissance confirms, clarifies, and supplements information provided by maps, aerial photos, and other sources.

a. Conduct aerial reconnaissance if aircraft is tactically possible.

b. Conduct ground reconnaissance of as much of the terrain as time and circumstances permit.

c. Take key subordinate leaders on the reconnaissance. They will better understand the plan and more effectively prepare and brief their subordinates. Solicit their ideas and comments prior to finalizing the plan.

9. Complete Detailed Plan. Based on all of the previous analysis, the patrol leader decides how he will accomplish his mission to include the following major determinations:

a. Missions in the objective area.

b. Other missions.

c. Times of departure and return.

d. Primary and alternate routes.

e. Plan for departure and reentry of friendly areas.

f. Organization for movement (formation, location of individuals, teams, and elements within it).

g. Actions at danger areas.

h. Actions on enemy contact.

- i. Rally points and actions at rally points.
- j. Actions in the objective area.
- k. Debriefing.
- l. Rehearsals and inspections.
- m. Rations.
- n. Arms and ammunition.
- o. Uniform and equipment.
- p. Method for handling dead, wounded, and PWs.
- q. Signals/communications.
- r. Challenge and password.
- s. Chain of command.
- t. Location of leaders.

10. Issue Patrol Order. The patrol leader orally presents the plan to his subordinates using the standard format as follows:

PATROL ORDER

- 1. SITUATION (as it affects the patrol).
 - a. Enemy forces: Weather, terrain, identification, location, activity, and strength.
 - b. Friendly forces: Mission of next higher unit, location and planned actions of units on right and left, fire support available for patrol, missions, and routes of other patrols.
 - c. Attachments and detachments.
- 2. MISSION. What the patrol is going to accomplish and the location or area in which it is to be done.
- 3. EXECUTION.
 - a. Concept of operation. The overall plan; missions of elements, teams, and individuals in the objective area; and fire support plan.

b. Other missions, not in the objective area for example, teams, and individuals. Included are such tasks as navigation, security during movement, and security at halts.

c. Coordinating instructions.

- (1) Times of departure and return.
- (2) Primary and alternate routes.
- (3) Departure and reentry of friendly areas.
- (4) Organization for movement.
- (5) Actions at danger areas.
- (6) Actions on enemy contact.
- (7) Rallying points and actions at rallying points.
- (8) Actions in the objective area.
- (9) Debriefing.
- (10) Other actions.
- (11) Rehearsals and inspections.

4. ADMINISTRATION AND LOGISTICS.

a. Rations.

b. Arms and ammunition.

c. Uniform and equipment (state which members will carry and use).

d. Method of handling wounded and prisoners.

5. COMMAND AND SIGNAL.

a. Signal.

(1) Signals to be used within the patrol.

(2) Communication with higher headquarters. Radio call signs, primary and alternate frequencies, times to report, and special code to be used.

(3) Challenge and password.

b. Command.

(1) Chain of command.

(2) Locations of leaders at various times--during movement, at danger areas, at the objective.

11. Supervise, Inspect, and Rehearse.

a. Supervise. Supervision is a continuous procedure exercised by leaders at all echelons to insure that the preparation is completed in an efficient and timely manner.

b. Inspect. This action insures that patrol members are both physically and mentally ready. Form the patrol at a specific location and systematically check the men to insure that they--

(1) Have the proper equipment and are dressed in accordance with instructions.

(2) Have a thorough understanding of their personal tasks and the tasks of their team, element, and of the patrol.

(3) Know the other important details of the mission such as challenge and password, codes, radio call signs, visual signals, etc.

c. Rehearse. As time permits, the patrol should rehearse actions in the objective area, movement, and any other critical tasks to be accomplished. This procedure will insure that all members really understand their tasks and will increase their proficiency at performing them.

REFERENCES:

FM 21-75, Combat Training of the Individual Soldier

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (chap 6, sec I, pages 6-1 thru 6-8)

Ranger Handbook (pages 2-1 thru 2-15)

PROCESS KNOWN OR SUSPECTED ENEMY PERSONNEL

CONDITIONS:

Given an area with friendly civilians and other friendly elements, two surrendering enemy personnel with weapons (rifles, bayonets, pistols, etc.) and military documents, a designated prisoner of war (PW) collection point 200 meters to the rear, and PW tags.

STANDARDS:

Within 15 minutes, without letting the prisoners talk to each other and without letting anyone harm them, remove all weapons and documents except individual identification, date, time, and circumstances of capture; and turn the prisoners' weapons and documents over to the collection point.

PERFORMANCE MEASURES:

Suspected or known enemy personnel must be handled under the following rules:

1. SEARCH prisoners (fig. 1) for weapons and documents as soon as you capture them. Take weapons to prevent resistance and take documents, except individual identification papers, to prevent the prisoners from destroying them. Prisoners from whom personal property is taken, including personal documents, should be given a written receipt for property. Allow prisoners to keep items needed for their general welfare or safety such as a protective mask.



Figure 1

2. **SEGREGATE** them into groups (fig. 2)—officers, noncommissioned officers, privates, deserters, civilians, females, and political indoctrination personnel. This prevents the leaders from organizing for a mass escape and from making the rest of the prisoners security-minded.



Figure 2

3. SILENCE (fig. 3) is essential. Do not allow prisoners to talk to each other. This helps to prevent plans of escape.



Figure 3

4. SPEED (fig. 4) prisoners to the rear. The information they have does no good until obtained by an interrogator and processed.

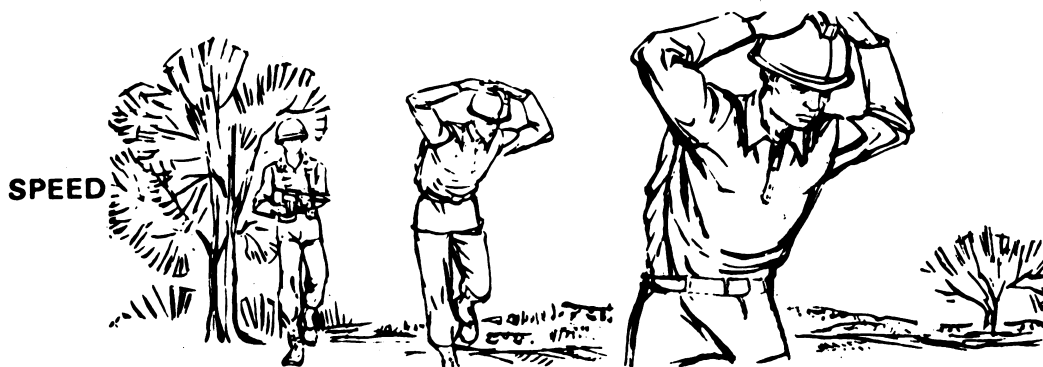


Figure 4

5. SAFEGUARD the prisoners (fig. 5) as you take them to the rear. Do not allow anyone to abuse them, but do not allow anyone to give them cigarettes, food, or water.

SAFEGUARD



Figure 5

6. TAGGING. A PW tag should include the capturing unit (a complete unit identification), date and time of capture, place of capture (grid coordinates or reference from a known point), and circumstances of capture (how PW was captured). The same format is used for documents and equipment except that circumstances identify where documents or equipment came from (i.e., from PW Ivan Schmidt, "found on dead enemy soldier," etc.) (fig. 6).

NOTE: Tags may be printed before combat or made out of materials at hand on the battlefield.


	TYPE DOCUMENT EQUIPMENT _____
	DATE TIME CAPTURED _____
	PLACE OF CAPTURE (GRID COORDINATES) _____
	CAPTURING UNIT _____
	CIRCUMSTANCES OF CAPTURE (HOW IT HAPPENED) _____

Figure 6

REFERENCES:

FM 21-75, Combat Training of the Individual Soldier and Patrolling,
Jul 67
TEC Lesson 935-071-1028-F, Processing Captured Personnel, Equipment,
and Documents

071-331-0806

IDENTIFY OPPOSING FORCE (OPFOR)
ARMORED VEHICLES

CONDITIONS:

During a field training exercise or in a classroom or suitable area in garrison, given a mockup, model, or photograph of opposing force (OPFOR) vehicles.

STANDARDS:

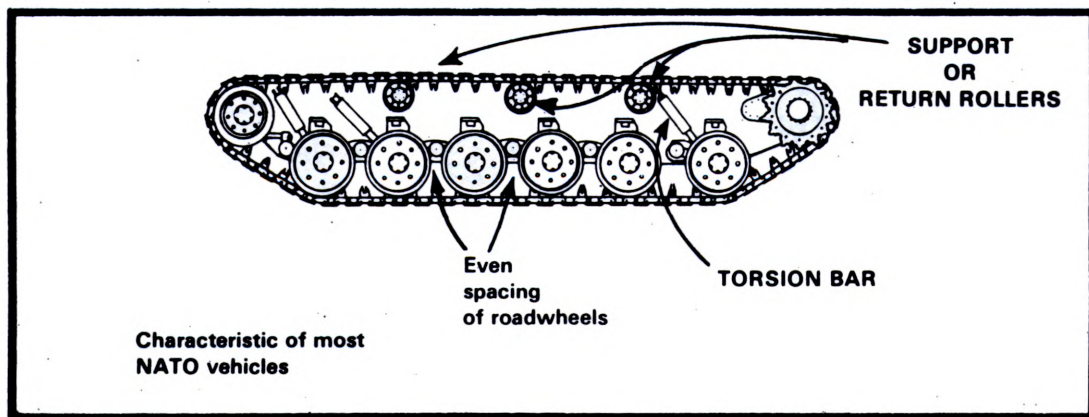
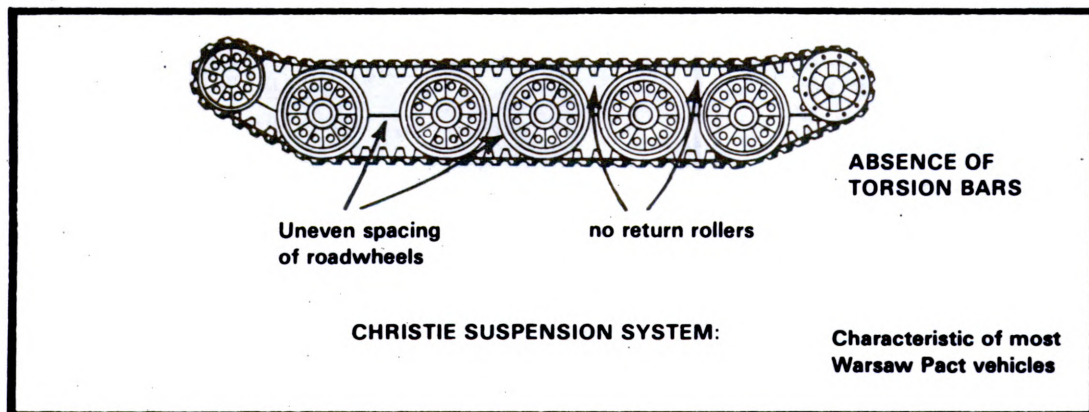
1. ALL SOLDIERS. Identify each vehicle observed as being either friendly or opposing forces.
2. 11B SCOUT OR NCO. Identify each vehicle observed by NATO nomenclature and state primary combat role of each.

PERFORMANCE MEASURES:

Tank Characteristics.

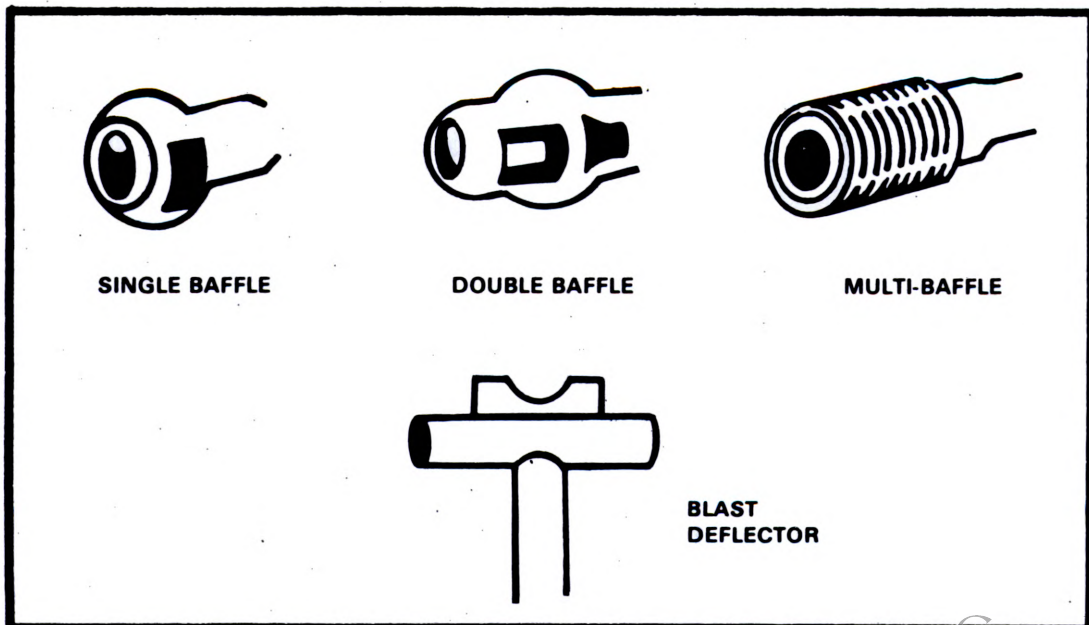
1. Identification. Tank identification is designed around four areas common to all tanks--
 - a. Track and suspension system.
 - b. Turret.
 - c. Main gun.
 - d. Cupola.
2. Track and Suspension System. Many tanks may be recognized by their track and suspension systems. However, recognition by this feature alone is often difficult as the tracks will often be obscured by grass or other objects. To identify the track and suspension system, check to see if it has support or return rollers. Except for the T-10, M-1970, and T-72 tanks, most Warsaw Pact vehicles do not have these rollers.

<p>NOTE: When using this method to help identify tanks, keep in mind that the M551 Sheridan in the US Army also has no return rollers.</p>
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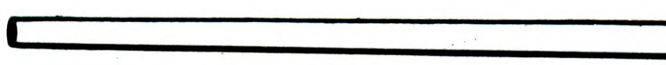


3. Main Gun. Armament varies from machineguns to large cannons. In turreted vehicles, the heaviest armaments are normally in the turret. Look for--

a. Muzzle brakes.



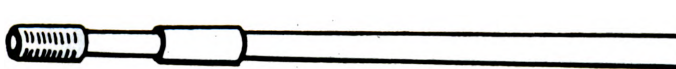
b. Main gun bore evacuator and its location.



MAIN GUN WITHOUT BORE EVACUATOR

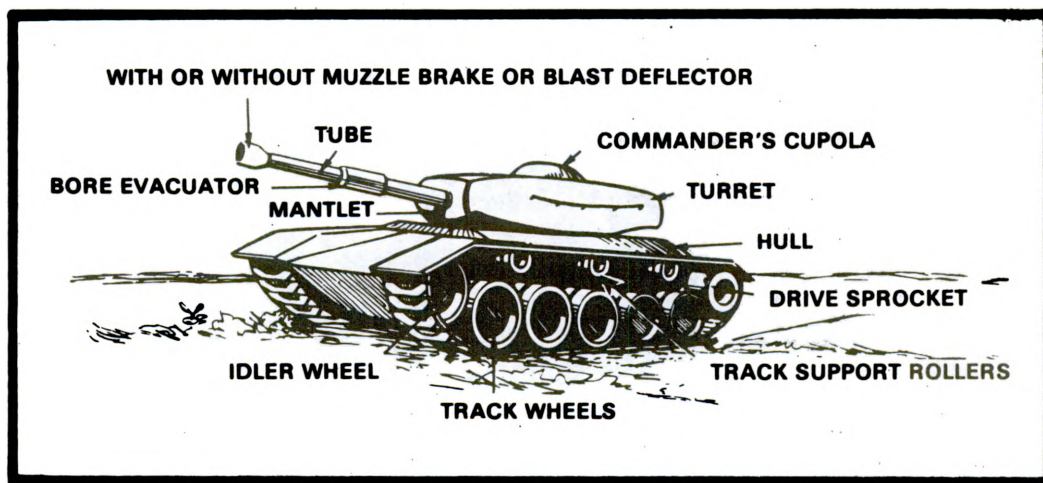


MAIN GUN WITH BORE EVACUATOR



**MAIN GUN WITH BORE EVACUATOR AND
MUZZLE BRAKE/BLAST DEFLECTOR**

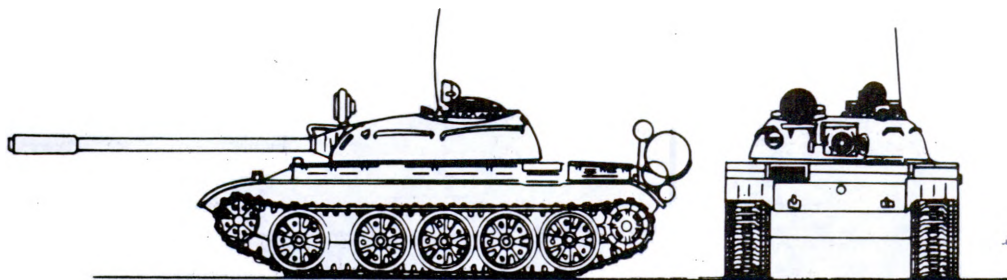
Note these common identification characteristics of both friendly and Threat tanks:



TANKS

Threat main battle tanks are smaller than the US main battle tank. They have a cruising range of about 300 miles without auxiliary fuel and can attain speeds of about 30 mph. Threat tank fire control is relatively simple compared to that of US tanks. Currently, they mount no rangefinder similar to those on US tanks. Most Threat main battle tanks are equipped with active infrared (IR) night viewing devices and have a superior underwater snorkeling capability.

NATO Nomenclature: T-55 tank.



Recognition features: Fully tracked; five-roadwheeled; space between first and second roadwheels; low-silhouetted, sloped hull; dome-shaped turret mounted over third roadwheel; bore evacuator at muzzle; infrared headlights; infrared searchlight for gun; seven variations of this model exist.*

Main gun range: 1,500 meters

Speed: 50 km/hr

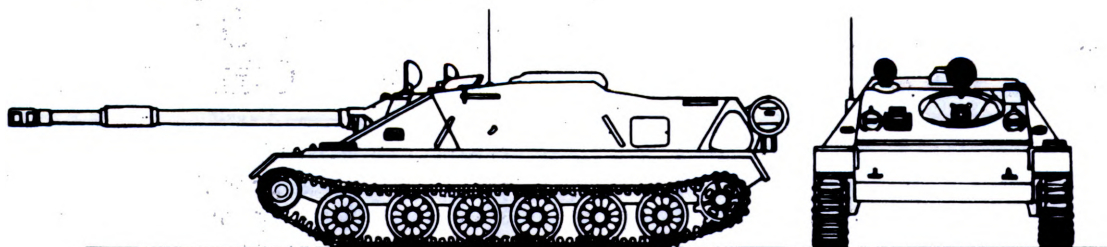
Range: 500 km

Users: India, Israel (with 105mm gun), People's Republic of China, United Arab Republic, USSR, Warsaw Pact

Employment: Medium battle tank in armored formations.

*T-55 and T-55A may mount 12.7mm antiaircraft machinegun.

NATO Nomenclature: ASU-85.



The ASU-85 airborne assault gun provides armored striking power to airborne forces. Although not amphibious, the ASU-85 chassis is based on that of the PT-76 tank. Its armament is an 85mm main gun and a 7.62mm coaxial machinegun. The ASU-85 mounts a large gunner's infrared searchlight above the mantlet and carries a small commander's light.

NATO Nomenclature: T-62 tank.



Recognition features: Fully tracked; five-roadwheeled; flat, low-silhouetted hull; dish-shaped turret over third roadwheel; no muzzle brake; bore evacuator three-fourths to muzzle.

Armament: One 115mm main gun
One 7.62mm machinegun (coaxial)
One 12.7mm antiaircraft machinegun

Main gun range: 2,000 meters

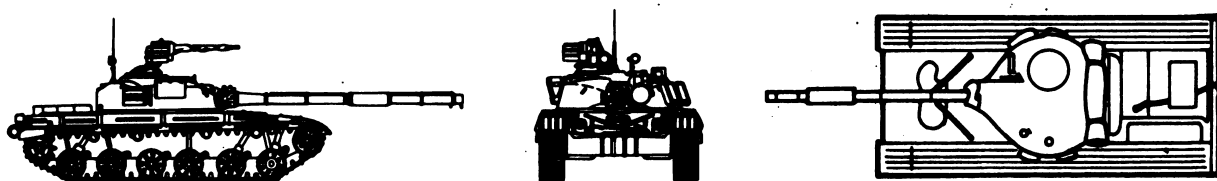
Speed: 50 km/hr

Range: 500 km

Users: United Arab Republic, USSR, Warsaw Pact

Employment: Main battle tank (medium) in armored formations.

NATO Nomenclature: T-72 medium tank.



Recognition features: Live track, complete with support rollers, centerguides, end connectors, and probable torsion bar suspension. Glacis plate is gently sloping and has a "V" shaped splash guard directly in front of driver's position; external fuel cells down both sides of tank; three equal size storage boxes on left-hand side of the turret, and two unequal size storage boxes on the right-hand side of the turret. Main gun has bore evacuator about one-third down the gun tube from the muzzle end.

Armament: One 115mm main gun
One 12.7mm antiaircraft machinegun (turret roof-mounted)
One 7.62mm machinegun (coaxial)

Main gun range: 2,000 meters (approximately)

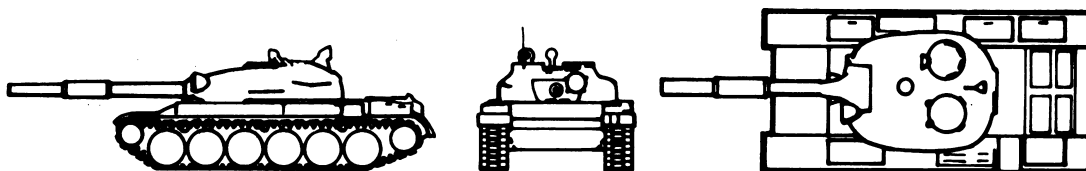
Speed: 55 km/hr

Range: 500 km (approximately)

Users: USSR

Employment: Main battle tank in armored formations.

NATO Nomenclature: M-1970 medium tank.



Recognition features: Six evenly spaced roadwheels; well-sloped glacis plate; infrared unit on left of gun; driver's hatch right of turret; bore evacuator first third of turret near muzzle.

Armament (probable):
One 115mm gun (smoothbore)
One 7.62mm machinegun (coaxial)
One 12.7mm antiaircraft machinegun

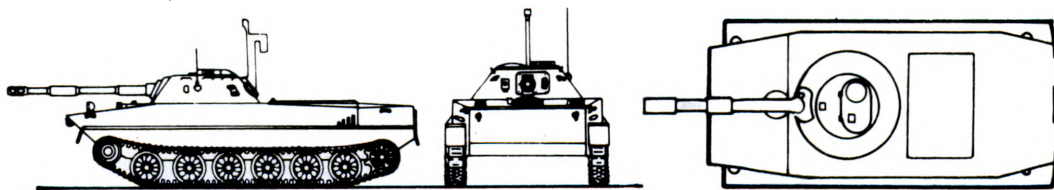
Speed: 60 km/hr (approximately)

Range: 500 km (approximately)

Main gun range: 2,000 meters

Employment: Armored formations; possible replacement for T-62.

NATO Nomenclature: PT-76 amphibious tank.



Recognition features: Fully tracked; six-roadwheeled; rectangular-shaped hull with a boat-like front; dish-type turret mounted over second roadwheel; chassis similar to BTR-50P; muzzle brake on main gun; bore evacuator close to muzzle.

Armament: One 76mm main gun
One 7.62 machinegun (coaxial)
One 12.7mm antiaircraft machinegun (on some versions)

Speed: 45 km/hr (land)
10 km/hr (water)

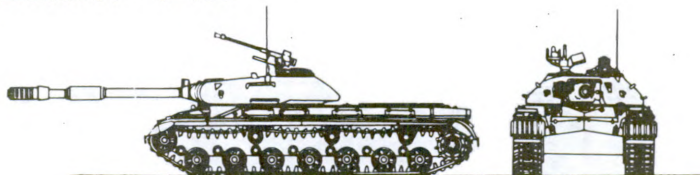
Range: 250 km

Main gun range: 1,000 meters

Users: People's Republic of China, United Arab Republic, USSR, Warsaw Pact

Employment: Amphibious reconnaissance tank; personnel movement (up to six plus crew) in maneuver divisions and regiments.

NATO Nomenclature: T-10.



The T-10 heavy tank is rarely seen in Threat forward areas. This tank stays in the rear and is used in counterattacks or with tank-killer units. It is equipped with infrared sights or devices for all crewmembers and has seven pairs of roadwheels. Its primary weapon is a 122mm stabilized gun firing kinetic energy armor-piercing cap and chemical energy high explosive antitank ammunition. It has two 12.7mm machineguns, one for antiaircraft and another mounted coaxially with the main gun.

Strengths. The strengths of Threat main battle tanks are--

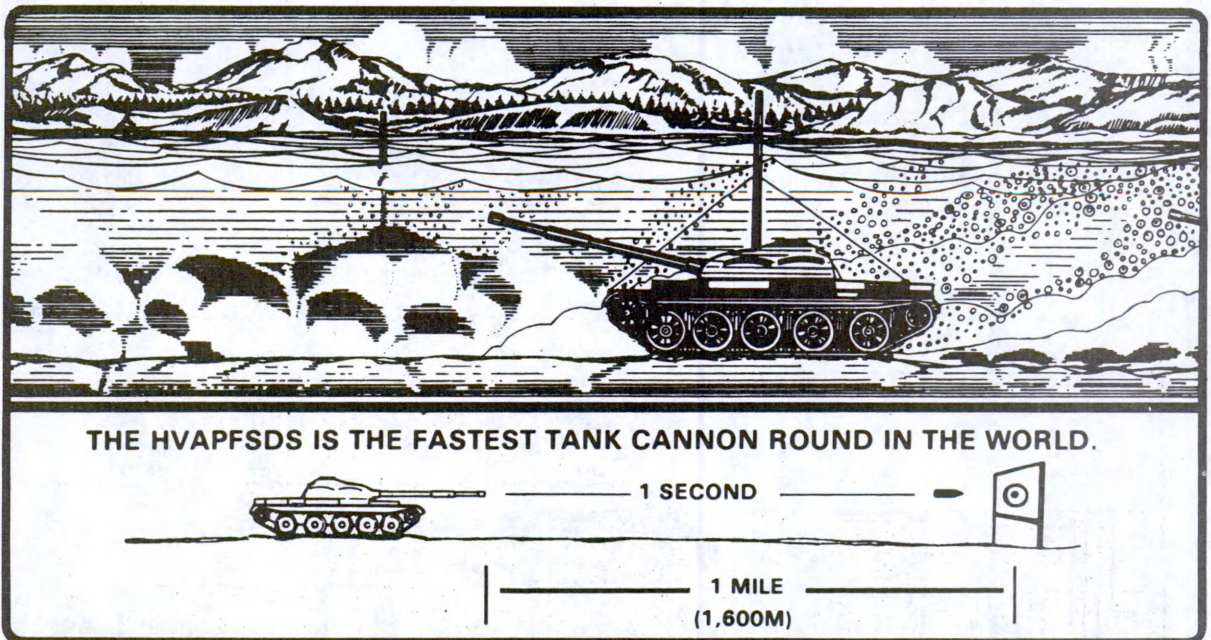
Low silhouette, which makes them harder to hit.

Simple fire control, which makes them easier to operate and maintain.

Infrared night vision devices, which increase effectiveness at night.

Underwater snorkeling, which permits them to cross water barriers quickly.

The high-velocity 115mm APFSDS tank-defeating round, which travels a mile every second. The accuracy of this round gives T-62 tank crews a 50 percent chance of hitting a stationary target in the open with the first round at ranges to 1,500 meters, or a moving target traveling at a constant speed in the open at ranges to 1,000 meters.



Weaknesses. The weaknesses of Threat main battle tanks are--

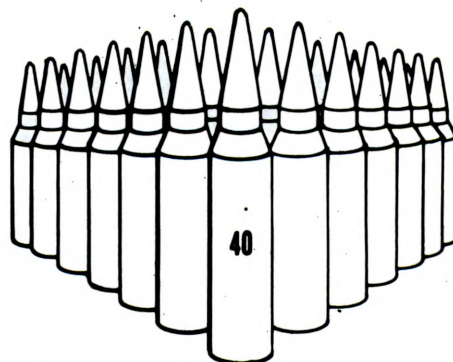
Threat tank fighting compartments are considerably smaller than those in US tanks. The crew is cramped, and freedom to move is restricted. Crew fatigue can therefore be a bigger factor in Threat tanks.

Smaller turret interior and larger (115mm) main gun ammunition means that Threat tanks have a slower rate of fire than US tanks.

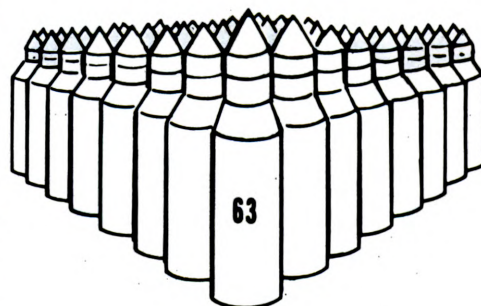
Because of its small fighting compartment, the T-62 tank has 23 fewer rounds of main gun ammunition than the M60A1. Therefore, in tank duels Threat tanks may run out of ammunition sooner than US tanks.

Some main gun ammunition is strapped along the turret walls, and hits above the turret ring may cause secondary ammunition explosions.

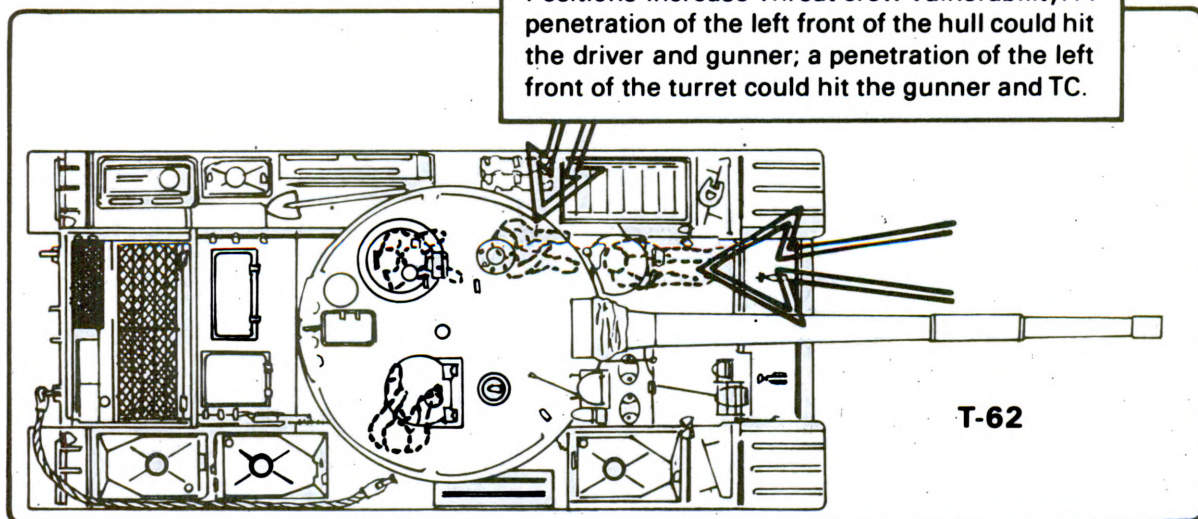
T-62



M60A1

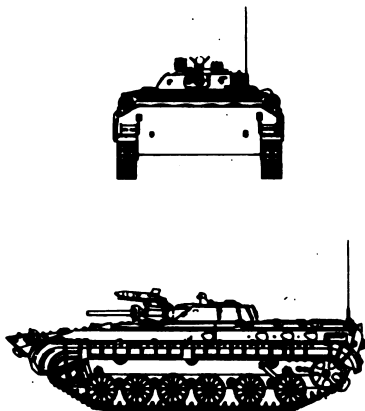


Positions increase Threat crew vulnerability. A penetration of the left front of the hull could hit the driver and gunner; a penetration of the left front of the turret could hit the gunner and TC.



INFANTRY COMBAT VEHICLES

NATO Nomenclature: BMP.

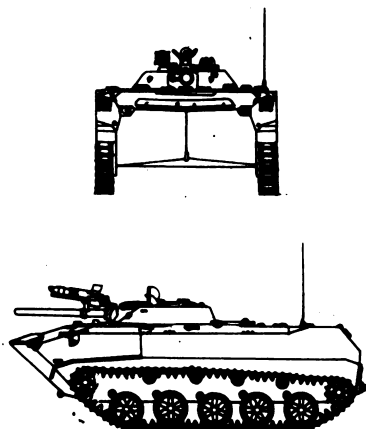


The amphibious BMP is used as both a reconnaissance and an armored fighting vehicle. The armored infantry version of the BMP has a crew of three--gunner, driver, and vehicle commander--and has a rear compartment troop capacity of eight. There are four periscopes and firing ports on each side allowing the infantry to fire from inside the vehicle while on the move. Its main armament is a 73mm smoothbore gun with a Sagger missile rail mounted over the gun. A 7.62mm PKT coaxial machinegun is mounted on the turret. Each BMP has racks for two Sagger missiles.

Recognition features: Six-roadwheeled, tracked, amphibious, ICV; engine in front; two doors in rear; four hatches in top of crew compartment; low silhouette with flat revolving turret. (May have Sagger mounted above gun.)

Employment: Motorized rifle units.

NATO Nomenclature: BMD.



The Airborne amphibious combat vehicle, BMD, resembles the BMP. It has five evenly spaced roadwheels on each side and is 5 meters long. It is air droppable, carries six troops, and has a turret similar to the BMP with a 73mm gun and Sagger missile launch rail. The BMD is amphibious and has a water propulsion system similar to the PT-76.

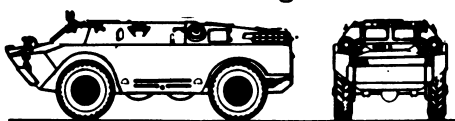
Recognition features: Five evenly spaced roadwheels; turret mounts the same as on the BMP; rear crew compartment; amphibious.

Employment: Motorized rifle units.

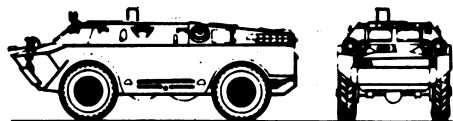
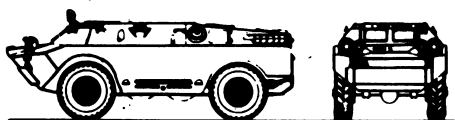
SCOUT VEHICLES

NATO Nomenclature: BRDM-2.

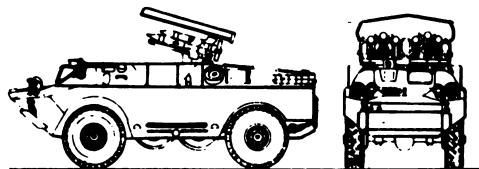
The BRDM-2 is a four-wheel drive amphibious scout car adaptable for many uses on the battlefield. It can be used as a command vehicle, an NBC test vehicle, an antiarmor vehicle, or an ADA vehicle. Cross-country mobility is improved by a centralized tire pressure regulation system and by four retractable auxiliary drive wheels located under the center of the vehicle which can be lowered to aid flotation and help in crossing gaps. The rear-mounted power plant is improved over that of the first BRDMs. Its armament is a turret-mounted 14.7mm machinegun. Its armament in the basic reconnaissance car is two machineguns mounted on the turret.



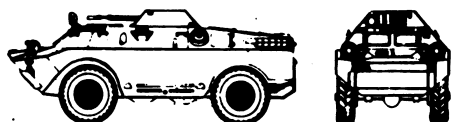
BRDM-2

CHEMICAL RECONNAISSANCE
VEHICLE

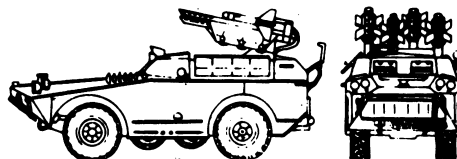
COMMAND VEHICLE



ATGM LAUNCHER



RECONNAISSANCE CAR

ANTIAIRCRAFT MISSILE
LAUNCHER

Recognition features: Four-wheeled, amphibious, armored reconnaissance vehicle; has full armored cover; has four small, rough terrain belly wheels that may be raised or lowered when needed.

Employment: As scout car in different variants; can mount Snapper, Swatter, or Sagger antitank missiles. Two versions: basic BRDM has a 7.62mm machinegun; BRDM-2 has a 14.5mm machinegun.

REFERENCES:

FM 71-1, The Tank and Mechanized Infantry Company Team,

071-331-0808

IDENTIFY OPPOSING FORCE (OPFOR)
WEAPONS AND EQUIPMENT

CONDITIONS:

Given a mockup, model, or photograph of OPFOR and NATO weapons and equipment.

STANDARDS:

Identify each weapon and piece of equipment by NATO nomenclature and as being friendly or Threat.

PERFORMANCE MEASURES:

1. Threat small arms are characterized by their heavy weight and high reliability. Emphasis is placed on simplicity of design for easy training, handling, and maintenance. Their automatic weapons are generally shorter than US models for use from inside APCs.

2. The standard Threat side arm is the 9mm Makarov semiautomatic pistol (PM), which uses an eight-round magazine.



Characteristics:

Length: 106mm

Weight: 0.81 kg

Effective range: 50 m

Magazine capacity: 8 rounds

Identifying features: Star on butt; weapon has a double-action trigger.

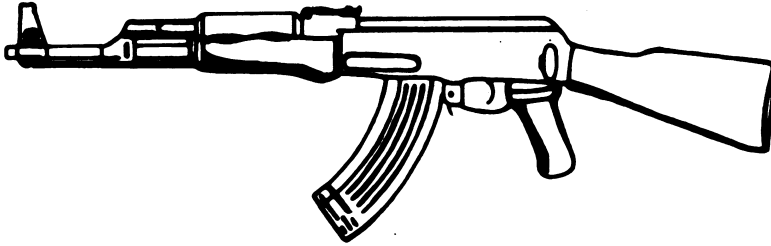
THREAT RIFLES AND MACHINEGUNS

1. Rifles:

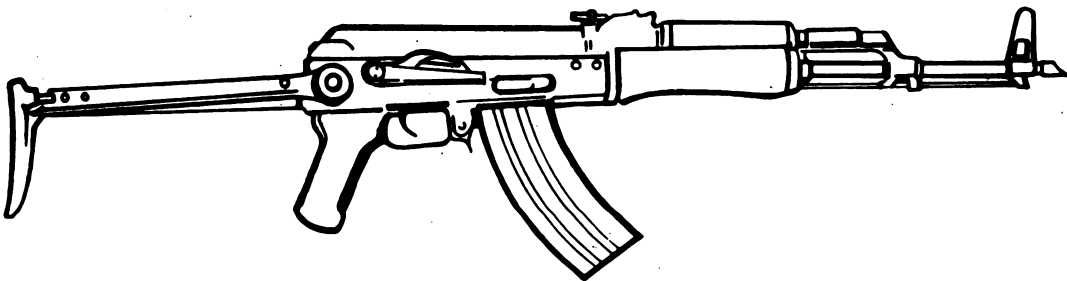
- a. AKM--7.62mm assault rifle.

NATO Nomenclature: AK (Knashnikov).

Identifying features: Gas cylinder above the barrel.



- b. AKMs--This new version has a folding stock.

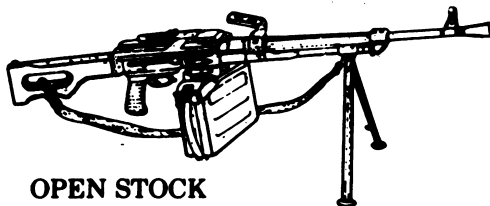


NOTE: Characteristics and identifying features same as AKM except for folding stock.

2. PK Series 7.62 General Purpose Machinegun:

NOTE: This machinegun appears in two versions.

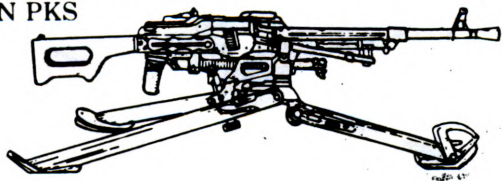
- a. The bipod-mounted PK used at the squad or company level.



OPEN STOCK

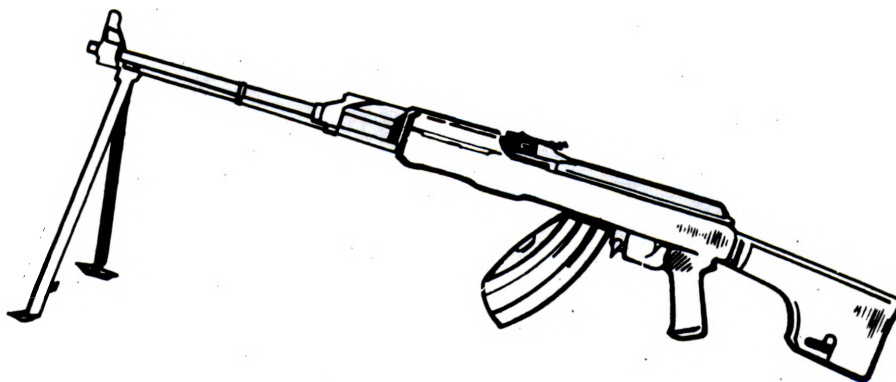
NATO Nomenclature: PK general purpose machinegun.

GAS CYLINDER
BELOW BARREL
ON PKS



b. The tripod-mounted PKS used as an antiaircraft weapon.

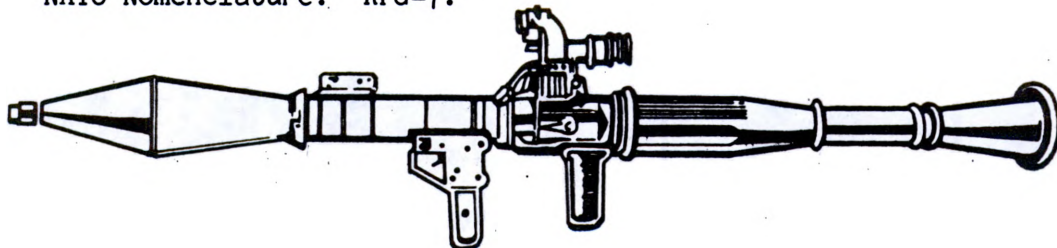
NATO Nomenclature: RPK 7.62mm light machinegun.



ANTITANK WEAPONS

In addition to large numbers of armored vehicles, Threat forces can be expected to saturate the battlefield with rocket-propelled grenades (RPGs), recoilless guns, and antitank guided missiles (ATGMs).

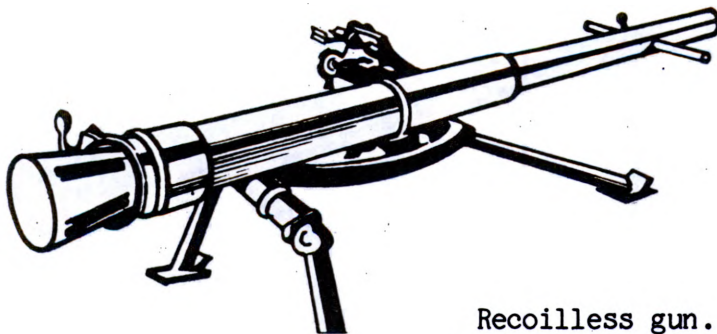
NATO Nomenclature: RPG-7.



Identifying features:
Two handgrips, large optical sight, and a flared cone on the end.

Rocket-propelled grenades. RPGs are shoulder-fired infantry antitank weapons; current models are effective to 500 meters.

NATO Nomenclature: SP-G-9 73mm antitank recoilless gun.



Identifying features:
Cone shape on the breech end.

Recoilless gun. The SP-G-9 is a new weapon. It is a tripod-mounted, man portable 73mm gun with a locked breech.



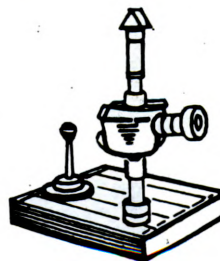
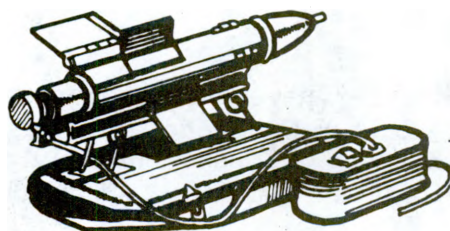
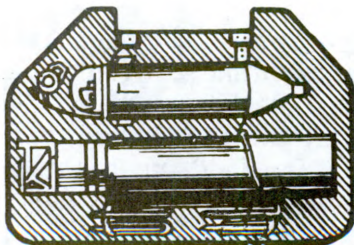
Antitank guided missiles. Threat forces have deployed two types of ATGMs in large numbers: the Sagger is wire-guided and thus invulnerable to electronic countermeasures (ECM); the Swatter is radio-guided and vulnerable to ECM.

ATGMs are highly accurate to 3,000 meters. They are highly mobile and can defeat all known armor.

Missiles can be mounted on BMPs, BMDs, BRDM-2s, and helicopters.

"Suitcase" Sagers can be man-packed and ground-mounted. In this version, the Sagger is easily carried by its crew. Its light weight and small size make it easy to transport, set up, and camouflage.

NATO Nomenclature: Sagger.



The Sagger is a wire-guided antitank missile with an effective range of 3,000 meters. A three-man team carries the portable launcher, the fire control equipment, and two complete missiles. Gunner normally displaces 15 meters from the missile during firing. In-flight identification: Look for smoke and flare trail.

Strengths. The main strengths of Threat ATGMs are--

Long-range accuracy and lethality, which permit them to hit and defeat all known armor up to 3,000 meters away.

Versatility of employment, which enables ATGMs to be fired while crewmen are buttoned up and, in the case of the Sagger on a BRDM-2, at a remote position up to 80 meters from the vehicle. The "suitcase" Sagger may be remotely fired from a position up to 15 meters from the launching rail.

Weaknesses. In spite of their reliability, mobility, and long-range effectiveness, Threat ATGMs have weaknesses.

Gunners must have good visual contact with both target and missile during flight. Threat ATGMs are not effective at night. US cavalymen who move behind cover, obscure themselves by smoke, or conceal themselves in vegetation reduce Threat missile and rocket hit probability. Bushes can break Sagger guidance wires, causing loss of missile control. Trees or heavy brush can detonate an ATGM warhead.

Gunners must be highly trained. Threat ATGM gunners must simultaneously track both target and missile with an optical viewer, while flying the missile with a "joystick" on a control box.

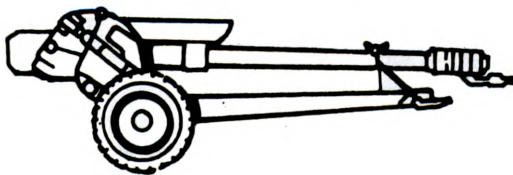
Missiles have a minimum range limitation. The missile has to fly about 500 meters after launch for the gunner to capture it in his viewer and accurately fly it to target. It is also slow moving when compared to the TOW.

ARTILLERY

Threat forces are equipped with a variety of excellent artillery weapons, from light and heavy mortars and conventional field guns and howitzers to multiple rocket launchers (MRLs) and missiles. MRLs can deliver saturation fire, while conventional artillery fires against targets of opportunity and preselected targets.

The most common field pieces are 122mm and 152mm towed howitzers. The maximum range of the 122mm howitzer is 15,300 meters, and its rate of fire is 7 to 8 rounds per minute.

NATO Nomenclature: 122mm howitzer, D-30.

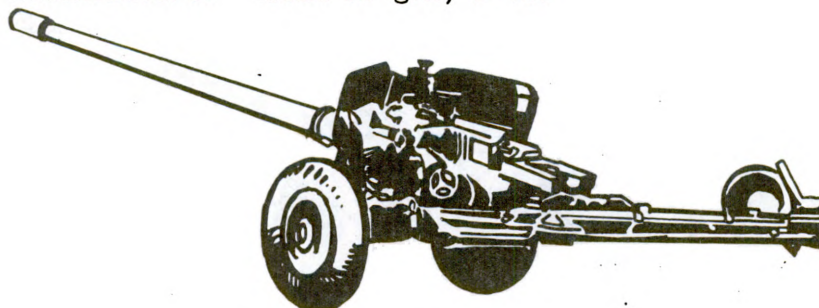


122mm howitzer, D-30

Recognition features: Three-trailed configuration; trails fold together and attach to tube for travel; towed by muzzle.

Employment: Direct support of maneuver company or battalion (regimental artillery battery and divisional artillery); weapon should appear 1 to 4 km behind the forward edge of the battle area in offense or 2 to 7 km in defense, depending on unit of assignment.

NATO Nomenclature: 100mm AT gun, T-12.

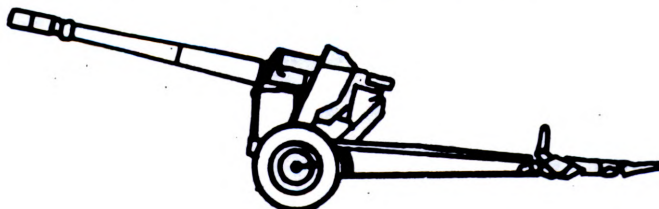


100mm antitank gun, T-12/T-12A

Recognition features: Long tube with cylindrical "pepperpot" muzzle brake; single castor wheel near trail ends; winged shield angled to rear on either side, T-12A only; added cylinder to right and above breech.

Employment: Support of maneuver battalion; weapon should appear approximately 0.2 to 0.5 km behind forward edge of the battle area in offense and 0.2 to 2.0 km in defense.

NATO Nomenclature: 152mm gun howitzer, D-20.

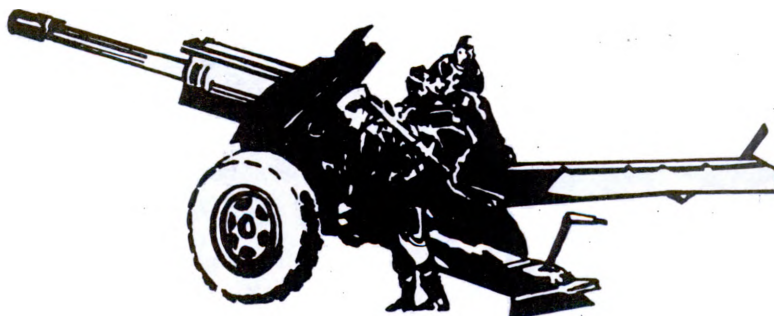


152mm gun howitzer, D-20

Recognition features: Prominent baseplate connected to bottom forward cradle for travel (same carriage as D-74); castor wheels and jacks at each trail end; scalloped winged shield with traveling central portion; shorter, larger diameter tube than D-74 with similar double-baffle winged, muzzle brake.

Employment: Weapon should appear 3 to 5 km behind the forward edge of the battle area in offense or 4 to 8 km in defense; organic to artillery battalions and regiments.

NATO Nomenclature: 152mm howitzer, D-1.

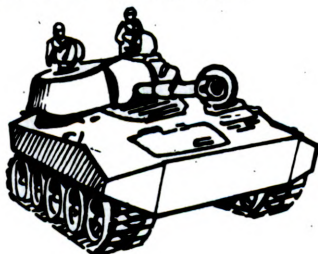


152mm howitzer, D-1

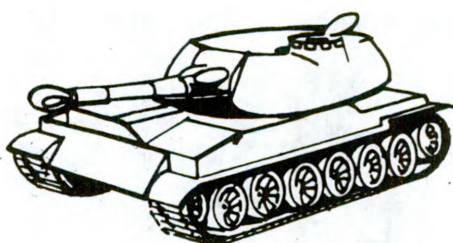
Recognition features: Essentially same appearance as the 122mm howitzer, M-30 (M1938) except larger diameter tube and added double-baffle muzzle brake.

Employment: Weapon should appear 2 to 3 km behind the forward edge of the battle area in offense and 3 to 5 km in defense; organic to artillery units at combined arms army/division level.

Threat forces have recently been equipped with two new mobile artillery pieces--122mm and 152mm self-propelled (SP) guns. The 122mm SP gun is mounted on a tracked carriage which resembles the hull of the BMP personnel carrier and running gear of the PT-76 tank. The gun is mounted in a turret with compartments and hatches for both gunner and commander. Not much is known about the 152mm SP.

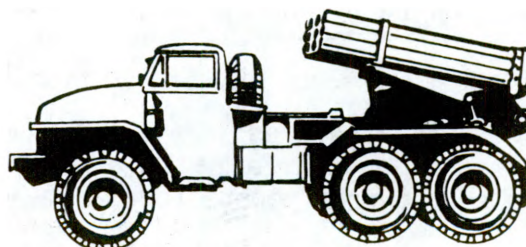
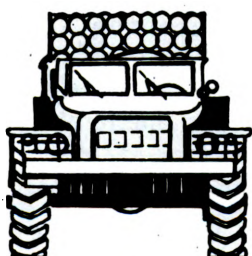


122mm SP gun



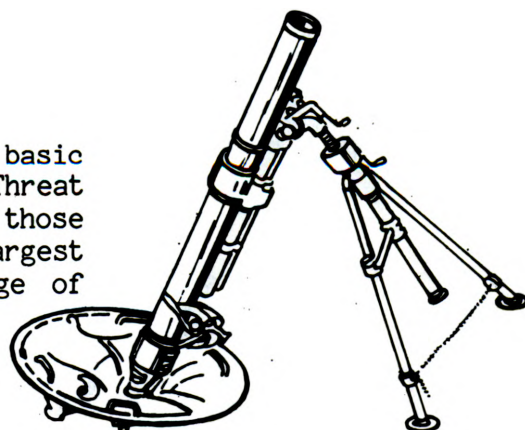
152mm SP gun

Threat forces usually use the multiple rocket launcher (MRL) for area coverage. These weapons are available in many sizes, but the most common is the 122mm truck-mounted launcher, which can rapid fire up to 40 rounds at ranges out to 20,000 meters.



122mm rocket launcher, BM-21

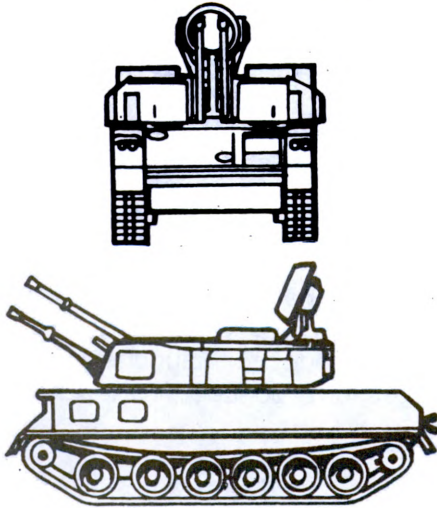
Threat mortars have the same basic support missions as US mortars. Threat mortars are almost the same as those found in US forces. One of the largest is the 120mm mortar with a range of 5,700 meters.



120mm mortar

ANTIAIRCRAFT ARTILLERY AND MISSILES

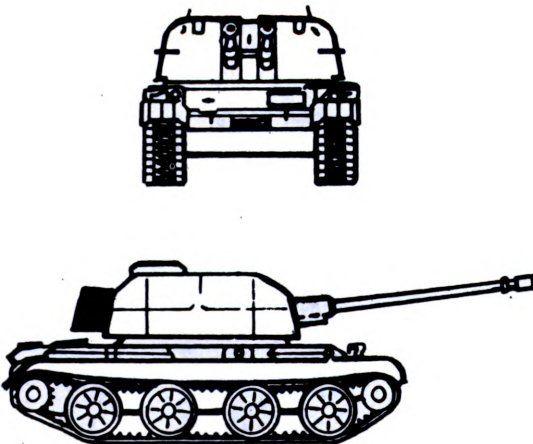
Antiaircraft artillery. The Threat army has been reluctant to replace its conventional antiaircraft guns with more sophisticated surface-to-air missile (SAM) systems. Antiaircraft artillery weapons range in caliber from 12.7mm to 130mm. Present emphasis is on automatic, rapid-fire, highly mobile guns and missile systems designed to provide field armies with effective low-level air defense.



The ZSU-23-4 is a self-propelled system mounting four 23mm guns with a completely integrated fire control system. The ZSU-23-4 is mounted on a light tracked chassis. Its onboard radar is used for both target acquisition and target tracking. Its four guns fire 800-1,000 rounds per minute, each with a tactical antiaircraft range of 3,000 meters and 2,000 meters without radar. It may be used against aircraft maneuvering to evade low- and medium-level surface-to-air missiles. The sustained rate of fire is 300 rounds per minute per barrel.

Recognition features: Full-tracked, six-roadwheeled vehicle; box-like hull with a rectangular turret centered over the third roadwheel; turret mounts four 23mm automatic antiaircraft guns.

Employment: Located in AD gun battery of motorized rifle and tank regiments; organic to AA regiment of maneuver divisions.



The ZSU-57-2 is used by field air defense units in tank divisions. It consists of a modified T-54 tank chassis carrying a twin S-68 57mm gun in a large, squarish, open top turret. The chassis has much less armor than the T-54 tank, and the running gear uses only four roadwheels. It weighs 28.1 tons. The turret is also identifiable by the large basket on the rear where empty cartridge cases are stored. It can fire 105-120 rounds per minute per gun with a tactical antiaircraft range of 4,000 meters.

REFERENCES:

FM 71-1, The Tank and Mechanized Infantry Company Team, Jun 77 (chap 2, pages 2-13 thru 2-17)

FM 31-11C-S

071-331-0809

EMPLACE AND RECOVER FIELD EXPEDIENT
WARNING DEVICES

CONDITIONS:

In daylight, given:

1. Used C-ration cans, used ammunition boxes, or other discarded metal containers.
2. Used small arms ammunition, pebbles, or other small, hard objects.
3. A location for a defensive position.
4. Barrier wire, WD-1 communication wire, or similar wire.
5. A suspected route of enemy advance or well-defined avenue of approach.
6. Thirty minutes to complete emplacement.

STANDARDS:

Within time specified, the devices must meet the following specifications:

1. Security--Devices must be securely attached to either barrier wire or WD-1 communication wire, etc., along a known or suspected route of enemy advance.
2. Concealment--Devices must not be readily observable by an enemy approaching at night.
3. Forewarning--Devices must produce sufficient noise to warn personnel in defensive position of enemy advancing toward their position.
4. Simplicity--Devices that could be used by the enemy against you must be easily removable upon leaving defensive position.

PERFORMANCE MEASURES:

1. Components. Field expedient warning devices are limited only by your imagination. Four basic components are needed.

a. Container (C-ration can, metal ammunition box, or any other metal container without a bright, shiny finish).

b. Noisemaker (pebbles, stones, brass ammunition casings, or any other small, hard objects which, when put in the container, will make a noise when the container is shaken).

c. Tripwire (WD-1, barrier wire, or any similar wire).

d. Attachment device (a small piece of wire, string, cloth, etc., to tie container to tripwire).

2. Construction.

a. Cut holes in the side(s) and bottom of the container (to reduce wind resistance and allow water drainage). If container has a bright, shiny finish, paint it with a subdued color (OD, brown, flat black) or cover it with mud (if only mud is available, consider using a different container).

b. Attach container to tripwire. If a wire barrier is in place, use it; if not, string tripwire across likely avenue of approach at knee level or below. Attach container at a spot where natural vegetation will conceal it from enemy detection.

c. Place noisemaking objects in container.

d. Take a position at a defensive listening post and have another squad member brush against the wire holding the cans, to make sure you can hear the noise produced.

3. Recovery. Before leaving defensive position, recover devices that could be used by the enemy against you.

REFERENCES:

TEC Lesson 952-061-0050-F, Expedient Early Warning Devices, Part I
TEC Lesson 952-061-0051-F, Expedient Early Warning Devices, Part II

071-331-0810

EMPLACE/RECOVER PYROTECHNIC
EARLY WARNING DEVICES

CONDITIONS:

Situation 1: Given an M49A1 trip flare (either live or inert) and a designated area for employment of any early warning device.

Situation 2: Given WD-1/TT field wire or string, an M3 pull release training device (either live or inert), nonelectric blasting cap, crimpers, and a designated area for employment of an early warning device.

STANDARDS:

1. Installing Devices:

a. Install trip flare (M49A1) or M3 firing device so that the devices are firmly attached in place across designated area.

b. Arm devices so that anyone moving the tripwire/strip string will make the device go off.

2. Removing Devices:

a. Remove trip flare by first reinserting the safety pin and then reversing installation procedures.

b. The M3 (live) is dangerous to disarm. It should be blown in place. If the device must be disarmed, proceed as outlined in the performance measures below.

PERFORMANCE MEASURES:

1. General. Trip flares and M3 firing devices with tripwire are employed extending across any trail approaching from the direction of enemy main forces, allowing for maximum observation of trail from friendly positions. Typical employment sites may have the following characteristics:

a. A narrow trail approaches from the direction of enemy main forces; it is about 100 meters forward and is near the adjacent friendly unit.

b. Two routes in open terrain approach your positions directly; each route is about 10-15 meters wide.

c. A narrow wash approaches to within 10-15 meters of a listening post.

d. A narrow trail, approaching from the direction of bypassed enemy.

2. To Emplace an M49A1 Trip Flare:

a. The location chosen for installation of the flare and tripwire should be in the logical path of infiltrating troops and so positioned that the field toward the enemy will be illuminated and friendly defense positions will not be disclosed.

b. In most instances, it is easier to install the flare using the pullpin method, because the amount of slack in the tripwire is less critical. Also, the tripwire may be installed to the left or right of the flare.

c. To mount bracket by nailing, use two of the nails provided. The bracket must be as vertical as possible and at a height of 15 to 18 inches above the ground.

d. To mount flare, align lever with trigger pivot.

e. Carefully slide flare downward into its bracket until bottom edge of lever is no more than one-sixteenth of an inch above--but not past--the bracket. In this position, note that the flare base is approximately one-half inch below the upper carriage bolt. The bottom end of lever is approximately three-eighths of an inch below the bracket prongs and is centered between these prongs (fig. 1).

NOTE: If the flare is positioned below the slot, in the bracket, the lever will not be free to move for proper arming. If the lever is not aligned with the trigger pivot and centered between the prongs, the lever will not be free to move for proper arming.

f. Clamp flare in its bracket by tightening upper wingnut with sufficient force to grip flare firmly.

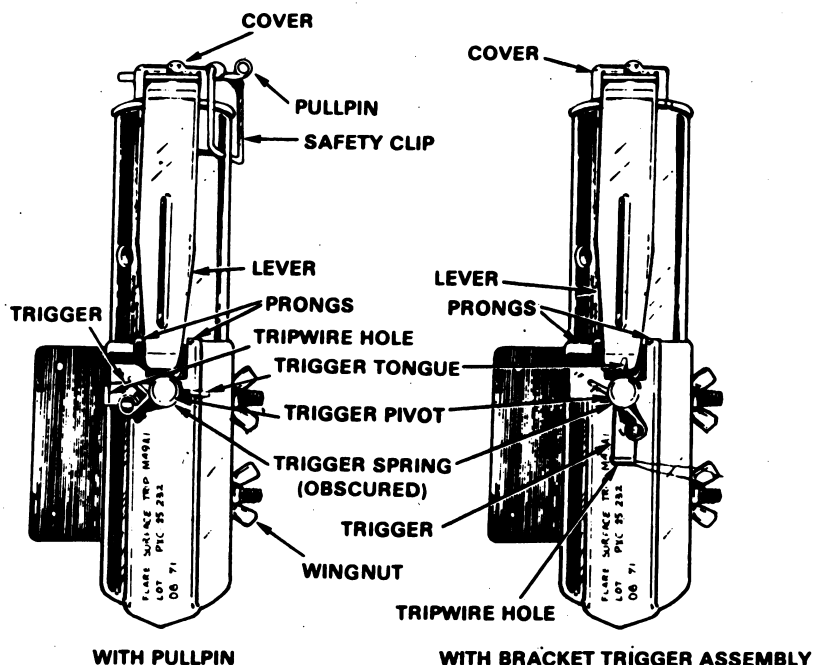


Figure 1

3. To Arm the M49A1 Trip Flare Using the Pullpin Method:

a. Fasten one end of tripwire to a post, stake, or other rigid object, at the desired distance (usually 40 feet) from flare and to the right or left of flare when facing flare trigger.

WARNING: Do not release lever when pressing it down (para 3b below) because release of lever will cause flare to function.

b. Press lever down with one hand and move safety clip assembly.

c. While still holding lever, insert pullpin, which is attached to safety clip, through two safety clip holes of cover loading assembly.

WARNING: Before releasing lever (para 3d), make certain pullpin will hold in safety clip holes.

d. Carefully release hold on lever. Make certain pullpin is retained in safety clip holes by lever.

e. Pull loose end of tripwire taut and fasten it to loop in pullpin.

f. Check to see that the tripwire is taut and tightened at both ends.

g. Flare is now prepared for firing. Sufficient pressure applied to tripwire will pull safety from flare.

4. Misfire of the M49A1. In case of failure to fire, the flare should not be approached for 5 minutes. After the waiting period, the flare should be removed carefully and forwarded to authorized personnel for disposal.

5. Recover Flares Prepared for Use But Not Used. Follow procedures below to disarm.

| WARNING: Any flare having a loose cover loading assembly will |
| be forwarded to authorized personnel for disposal. |
| Make no attempt to reassemble or tighten cover |
loading assembly.

a. Disarming.

(1) Carefully depress lever against flare body.

(2) If pullpin was used as method of arming, remove pullpin.

| WARNING: Use only the safety clip holes in cover loading |
| assembly when reassembling safety clip. The other |
holes must not be used.

(3) Secure lever by inserting one end of safety clip through one of the safety clip holes of cover loading assembly; snap other end of safety clip into other safety clip hole.

(4) Detach wire from pullpin.

(5) Return flare to its original packing.

b. Inspection. Prior to returning flare to storage, perform an inspection.

6. To Emplace an M3 Pull Ring Firing Device.

a. Functioning.

(1) Pull method. A pull of 6 to 10 pounds on taut wire will cause device to fire.

(2) Tension-release method. Release of tension (cutting of taut tripwire) will cause device to fire.

b. To install the M3 firing device (fig. 2).

(1) Remove protective cap.

(2) With crimpers, attach blasting cap to standard base. Crimper jaws should be placed no farther than one-fourth inch from open end of blasting cap.

(3) Attach firing device assembly to anchor (must be firm enough to withstand pull of at least 20 pounds).

(4) Secure one end of tripwire to anchor and place other end in hole in winch.

(5) With knurled knob, draw up tripwire until locking safety pin is pulled into wide portion of safety pin hole.

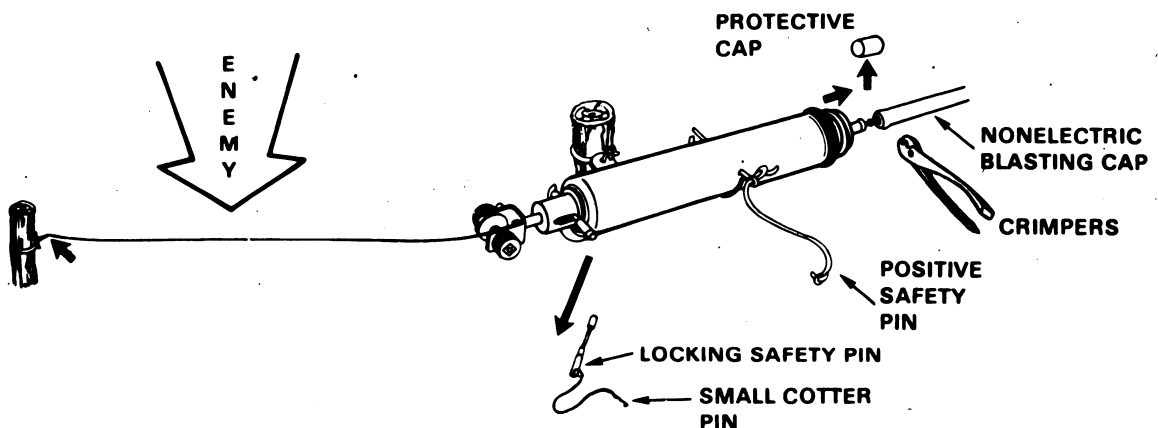


Figure 2

c. Arming.

(1) With cord, remove small cotter pin from locking safety pin and withdraw locking safety pin. If it does pull out easily, adjust winch winding.

(2) With cord, pull out positive safety pin. This should pull out easily. If not, disassemble and inspect.

d. Disarming.

(1) Insert length of wire, nail, or cotter pin in positive safety pin hole.

(2) Insert length of wire, nail, or safety pin in locking safety pin hole.

(3) Check both ends and cut tripwire.

(4) Separate firing device from charge and return firing device to its container.

NOTE: Insert positive safety pin first. Cut tripwire last.
--

REFERENCES:

FM 5-25, Explosives and Demolitions, Feb 71 (chap 1, sec VI, pages 1-36 thru 1-37)

FM 5-34, Engineer Field Data, Sep 76 (chap 3, sec I, page 46b)

FM 20-32, Mine/Countermining Operations at Company Level, Nov 76 (app D, page 153)

TM 9-1345-203-12&P, Land Mines, Jan 76

071-331-0811

EMPLACE/RECOVER ELECTRONIC
ANTI-INTRUSION DEVICES

CONDITIONS:

Given a patrol seismic intrusion device (PSID) detector unit (in storage), an area of emplacement of the PSID, a detection range setting, and a PSID receiver and receiver operator in the area of emplacement.

STANDARDS:

1. Within 8 minutes, emplace the PSID IAW the performance measures for emplacement.
2. Within 5 minutes, recover the PSID and return to storage configuration IAW the performance measure for recovery.

PERFORMANCE MEASURES:

1. Unpacking (fig. 1).
 - a. Remove the detector sets and receiver sets from the carrying cases and remove the clips which are over the end of each unit. Remove the geophone from the clip on the detector and unwrap the geophone cables. Remove the headset and headband from the carrying case. Connect the headset cable to the receiver set.
 - b. Inspect each unit for damage (e.g., broken antenna, cracked case, damaged cable). If any damage exists, either repair or reject the unit.
 - c. Remove the batteries from their shipping carton. Place the ON/OFF sensitivity switch on the detector sets in the OFF position and the ON/OFF switch on the receiver set in the OFF position. Install the batteries in the detector sets and the receiver set. Place 10 spare batteries in the alarm set carrying case.

d. Make sure that all detectors of the alarm set are marked with the same RF as the receiver. All four pulse codes should be present. The units with the wrong frequency of pulse code will be taken from the alarm set and returned to supply.

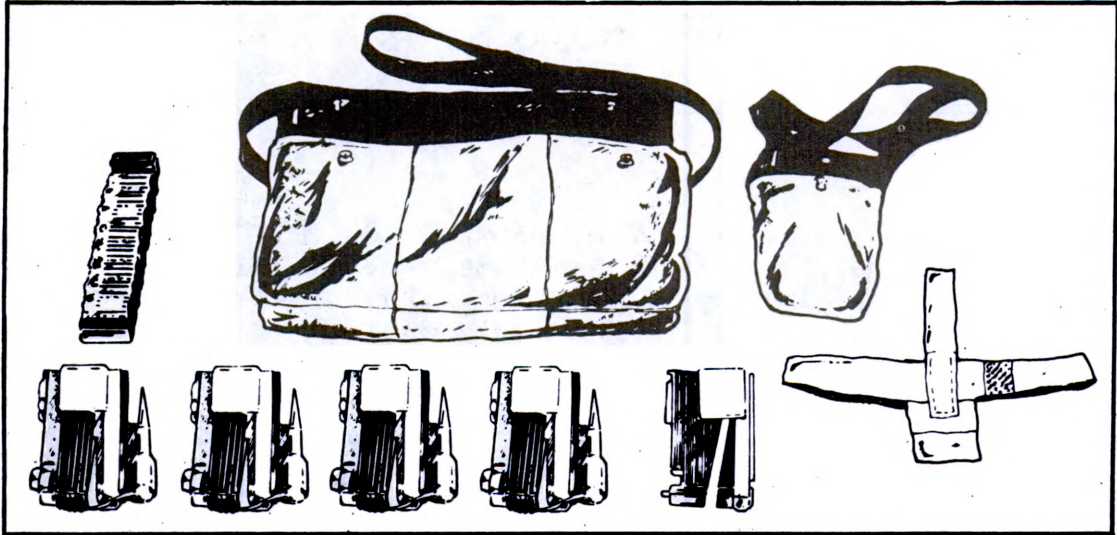


Figure 1. Alarm set, anti-intrusion (PSID).

2. Preparation and Checkout.

a. Select a suitable location for the checkout area. The conditions of this area should be similar to those of the actual use area.

b. Select one of the detector sets and notice the pulse code marked on the detector case. Emplace the detector set in the checkout area as shown in figure 2. The receiver operator should be 4 to 5 meters (13 to 16 feet) from the detector set.

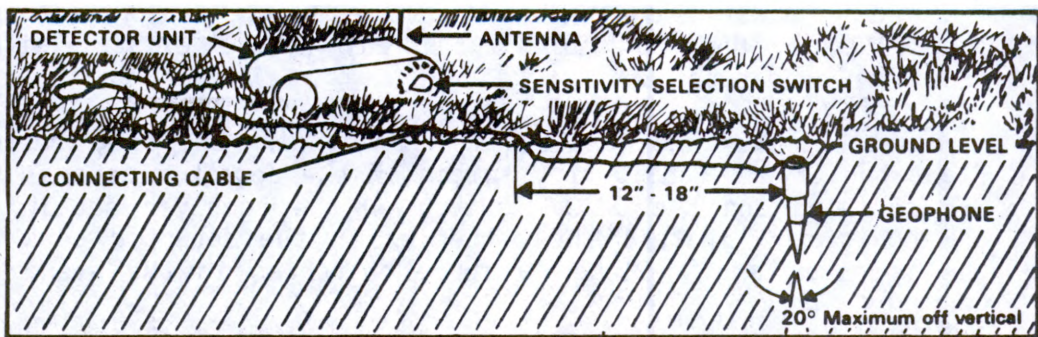


Figure 2. PSID emplacement.

c. Turn the detector ON/OFF sensitivity switch to position number one and the receiver ON/OFF switch to the ON position. If the detector receiver operator does hear a signal, either there is excessive background noise in the checkout area or the detector set is defective.

d. When the detector operator moves within the radius of the detector range shown in figure 3, the receiver operator should hear a signal.

NOTE: He may or may not hear a signal for each movement.

e. If the receiver operator hears a signal or signals which match the pulse code marked on the detector set, the position of the ON/OFF sensitivity switch and the distance between the detector set and receiver set should be noted for proper setup when the detector is deployed in the use area. Return the ON/OFF sensitivity switch to the OFF position. Remove the geophone from the ground. Wipe the case and geophone clean; then return the detector set to the carrying case for move to the use area.

ON/OFF SENSITIVITY SWITCH POSITIONS	PERSONNEL MOVEMENT RANGE
OFF	0 feet 0 meters
1	8 feet 2.6 meters
2	15 feet 4.9 meters
3	50 feet 16.5 meters
4	70 feet 23 meters
5	130 feet 43 meters

Figure 3. Detector sensitivity range.

f. If the receiver operator does not hear a signal, set the ON/OFF sensitivity switch to the next higher position and/or decrease the distance between the detector set and receiver set as necessary until the receiver operator hears a signal or signals matching the pulse code marked on the detector case, and repeat paragraph 2e.

g. In all cases, select the switch setting which allows no false signal when the detector operator is not moving, but which gives a signal when the detector operator moves within the detector sensitivity range. If both conditions cannot be met, select the nearest approximations or relocate the checkout area to a location with less background noise.

h. Repeat the preceding procedure for each of the detector sets.

3. Emplace the Detector Sets.

a. The detector sets will be emplaced as shown in figure 2. The deployment location should be one which has a low level of background noise (background noise is defined as any undesired vibration within the sensitivity range of the detector set, such as high winds, rain, low-flying aircraft, and similar sources of ground disturbances). Some areas which present high levels of background noise would be airfields, heavily traveled roadways, heavily congested areas, and roadways with heavy vehicles traveling as much as a mile from the detector set. Background noise of a sufficient level could cause the detector set to transmit meaningless signals indicating movement in an area where there is none.

b. Remove the plastic storage clip from the PSID unit.

c. Unclip the geophone and unwind the connecting cable and antenna. Slide the plastic clip back over one end of the detector unit so it will not be mislaid.

d. Push the geophone straight down into the ground (no more than 20° off vertical or it will not work). Do not drive the geophone into the ground by striking it with a hard object or stamping on it. Loosen the soil with an entrenching tool, stick, or other sharp object, if necessary.

e. Bury 12 to 18 inches of the connecting cable adjacent to the geophone. This cuts down on the possibility of cable movement activating the geophone. (See fig. 2.)

f. Position the detector unit on the ground, being sure the antenna is not in contact with any wet foliage that might ground it.

g. Set the sensitivity selection switch for the detection range you have been given.

h. During daylight hours, camouflage the detector unit and connecting cable with dry twigs and weeds. This is not usually necessary at night.

4. Geophone. The geophone senses the movement of personnel and vehicles in the area of the detector. The detector in turn transmits a message until the movement is outside the detector's sensitivity range. If it is desirable to establish the direction of movement, the detectors can be arranged in such a manner where movement from one detector range into another detector range will indicate the direction of travel. Under ideal conditions, the transmitted signal from the detector set will be received a maximum of 1 mile (1,852 meters).

5. Receiver Set.

a. The two acceptable configurations in which the receiver set may be utilized are shown in figure 4. In the configuration "a," the receiver may be placed on a table, the ground, or held in the hand. The antenna should be free of any obstruction. In configuration "b," the receiver may be placed in the shirt pocket. CAUTION: The antenna should be on the side away from the body to avoid the possibility of malfunction or poor reception due to body perspiration.

b. When the receiver picks up the transmitted signal, it converts it to a pulsed audio tone which is heard through the headset. An experienced receiver operator will be able to determine which detector is transmitting by the tone, as well as the number of pulses. In place of the headset, a small speaker of the proper impedance may be used, or an amplifier with the proper input impedance may be used in conjunction with the receiver set.

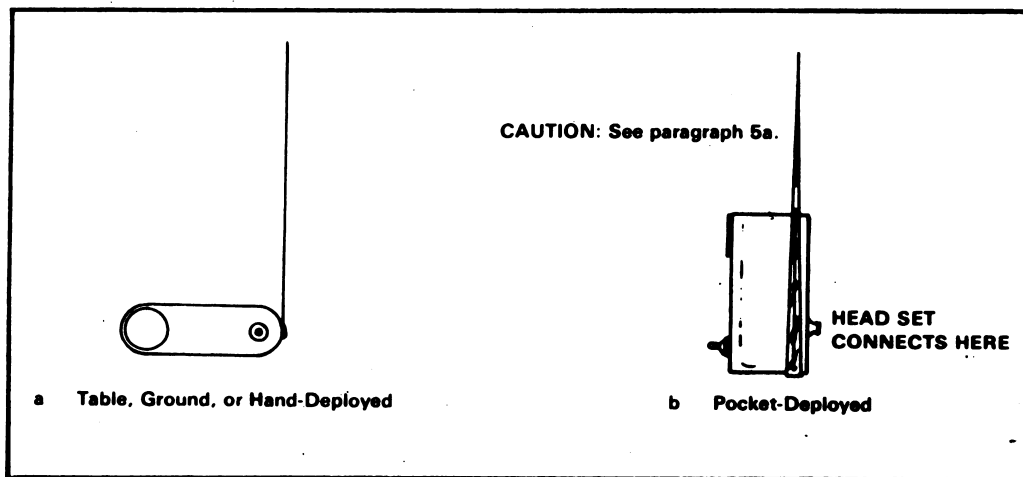


Figure 4. Receiver configuration while in use.

6. Recovering the PSID.

a. Locate the detector unit and turn the sensitivity switch to the OFF position.

b. Trace along the connecting cable and gently uncover the buried cable until you get to the geophone.

c. Dislodge the geophone by grasping it, not the connecting cable, and pulling it loose.

d. Remove the storage clip and brush all dirt and debris off the equipment.

e. Rewind the antenna around the detector unit, wrap the cable around the unit, clip the geophone into the holder, and fasten the plastic storage clip over the wire and antenna.

REFERENCES:

TM 5-6350-249-12, Operator and Organizational Maintenance Manual including Repair Parts and Special Tool Lists: Alarm Set, Anti-Intrusion; Restricted Area, AN/GSQ-151

TEC Lesson 952-061-0054-F, Early Warning Devices: Electronic, Part I

TEC Lesson 952-061-0055-F, Early Warning Devices: Electronic, Part II

071-331-0820

ANALYZE TERRAIN USING THE FIVE MILITARY ASPECTS OF TERRAIN

CONDITIONS:

Given any tactical mission which involves a specified route or location on the ground or map.

STANDARDS:

Analyze route or location in terms of the military aspects of terrain (observation and fire, concealment and cover, obstacles, key terrain, and avenues of approach) and determine how each affects the mission.

PERFORMANCE MEASURES:

Terrain is analyzed in terms of its five military aspects (observation and fire, concealment and cover, obstacles, key terrain, and avenues of approach) to determine the effect of terrain on the general courses of action available to friendly and enemy forces.

1. Observation and Fire.

a. Observation depends on conditions of terrain which permit a force to locate the enemy either visually or through the use of surveillance devices. The best observation generally is obtained from the highest terrain features in an area. The effects of visibility on observation are analyzed with weather. Visibility and observation are analyzed independently because visibility varies with weather conditions, whereas observation varies with terrain conditions which are relatively permanent.

b. Fire encompasses the influence of the terrain on the effectiveness of direct and indirect fire weapons. The fires of indirect fire weapons are affected primarily by terrain conditions within the target area. Fields of fire for direct fire weapons are primarily affected by terrain conditions between the weapon and target.

c. You, the squad leader, must identify those terrain features within and adjacent to the area of operations which afford the friendly or enemy force favorable observation and fire. You consider them in your subsequent analysis of concealment and cover, key terrain, and enemy forces.

2. Concealment and Cover. Concealment is protection from observation; cover is protection from the effects of fire. As a squad leader, you must determine the concealment and cover available to both friendly and enemy forces.

a. Concealment may be provided by terrain features and vegetation such as woods, underbrush, or cultivated vegetation, or by any other feature which denies observation. Concealment does not necessarily provide cover.

b. Cover may be provided by terrain features or manmade features. Areas that provide cover from direct fire may or may not protect against the effects of indirect fire; however, most terrain features that offer cover also offer concealment.

3. Obstacles.

a. An obstacle is any natural or artificial terrain feature which stops or impedes military movement.

b. Consideration of obstacles is influenced by the mission.

c. An obstacle may be an advantage or disadvantage and must be considered on its own merits, in view of a specific mission. For example, obstacles perpendicular to a direction of attack favor the defender by slowing or canalizing the attacker. Obstacles parallel to the direction of attack may assist in protecting a flank of the attacking force.

4. Key Terrain. A key terrain feature is any locality or area whose seizure or control affords a marked advantage to either force. The term "seizure" clearly implies physical occupation of the terrain by a force, whereas the term "control" may or may not include physical occupation. The selection of key terrain varies with the level of command, the type of unit, and the mission of the unit.

5. Avenues of Approach.

a. An avenue of approach is a route for a force of a particular size to reach an objective or key terrain. To be considered as an avenue of approach, a route must provide enough width for the deployment of the size force for which the avenue of approach is being considered.

b. The analysis of an avenue of approach is based on the following considerations:

(1) Observation and fire. (Favorable observation and fire for the force moving on the avenue of approach.)

(2) Concealment and cover. (Provides favorable conditions of concealment and cover--this consideration is frequently in conflict with the preceding one.)

(3) Obstacles. (Avoids those which are perpendicular to the direction of advance and, whenever practical, takes advantage of those which are parallel to the direction of advance.)

(4) Utilizes key terrain.

(5) Provides adequate maneuver space.

(6) Ease of movement.

c. The analysis of an avenue approach is based solely on terrain considerations.

REFERENCES:

FM 30-5, Combat Intelligence, Oct 73 (app B, pages B-1 thru B-5)
TEC Lesson 935-071-1027-F, Analyze Weather and Terrain

FM 31-11C-S

081-831-1016

ADMINISTER FIRST AID FOR AN OPEN ABDOMINAL WOUND

CONDITIONS:

Given a casualty with an open abdominal wound. Required equipment: a first aid dressing.

STANDARDS:

Cover the wound with a first aid dressing, secure the dressing, and position casualty on his back with head to one side.

NOTE: Before administering first aid for any wound/injury, always check the casualty first to determine if these lifesaving measures are needed--

- A. Open the Airway and restore breathing and heartbeat.
- B. Stop the Bleeding.

Then examine him and perform these lifesaving measures, if necessary--

- C. Control/prevent shock.
- D. Dress and bandage wounds/splint fractures.

PERFORMANCE MEASURES:

1. Place the casualty on his back with legs slightly drawn up.
2. Expose the wound by removing any obstructing clothing, being careful not to touch the wound.
3. Cover the wound and any protruding organ with the first aid dressing. Do not touch or try to push protruding organs into the wound; however, if it is necessary to move an exposed intestine onto the abdomen in order to cover the wound adequately, then do so, using the sterile side of the first aid dressing.

4. Secure the dressing by sliding the dressing tails under the patient and by tying the tails at the edge of the dressing without applying excessive pressure. Use an additional bandage, if available, to further secure the dressing.

5. Do not give or allow the casualty to take anything by mouth, because it will eventually pass through his intestines and spread contamination in the abdomen. Moisten a cloth and apply to the casualty's lips to help lessen his thirst.

6. Leave the casualty on his back, preferably with legs drawn up to alleviate pain, and turn his head to one side because he might vomit.

7. Get casualty to a medical treatment facility as soon as possible.

REFERENCE:

FM 21-11, First Aid for Soldiers, Jun 76

081-831-1017

ADMINISTER FIRST AID FOR AN OPEN CHEST WOUND

CONDITIONS:

Given a casualty with an open chest wound. Required equipment: a first aid dressing or other material to seal and dress wound.

STANDARDS:

Seal the wound with an airtight covering, apply and secure a dressing over the sealed wound, and position the casualty with injured side down, or in a sitting position if casualty is conscious and can breathe easier this way.

NOTE: Before administering first aid for any wound/injury, always check the casualty first to determine if these lifesaving measures are needed--

- A. Open the Airway and restore breathing and heartbeat.
- B. Stop the Bleeding.

Then reexamine him and perform these lifesaving measures, if necessary--

- C. Control/prevent shock.
- D. Dress and bandage wounds/splint fractures.

NOTE: An open chest wound affects airway and breathing since air being sucked into the chest cavity will cause the lung to collapse. A distinct sucking sound may be heard at the wound site or it may be a nonsucking wound. First aid is the same for both.

PERFORMANCE MEASURES:

1. Expose the Wound. Rapidly and gently remove clothing from wound area.

2. Check for Exit Wound. If an exit wound exists as well as wound of entry, the larger of the two should be sealed first, as rapidly as possible.

3. Seal the Wound (fig. 1a and b). Using a clean technique, apply the inside of the plastic wrapper of the casualty's first aid dressing directly over the wound. If casualty is conscious, have him exhale forcibly and hold his breath, then apply the wrapper; if unconscious, apply the wrapper as he exhales.

NOTE: Other material can be used if this is not available. The primary consideration is to make the wound airtight.

4. Secure Seal With First Aid Dressing (fig. 1c). Secure the seal by applying the field first aid dressing over the wound and exert manual pressure evenly with the open hand. This is also applied, similar to the application of the seal, as the casualty exhales. Anchor the dressing in place by tying the tails of the bandage. Tie additional available bandaging materials (i.e., strips of material from clothing, blankets, poncho) around dressing and secure with belt.

FIELD FIRST AID

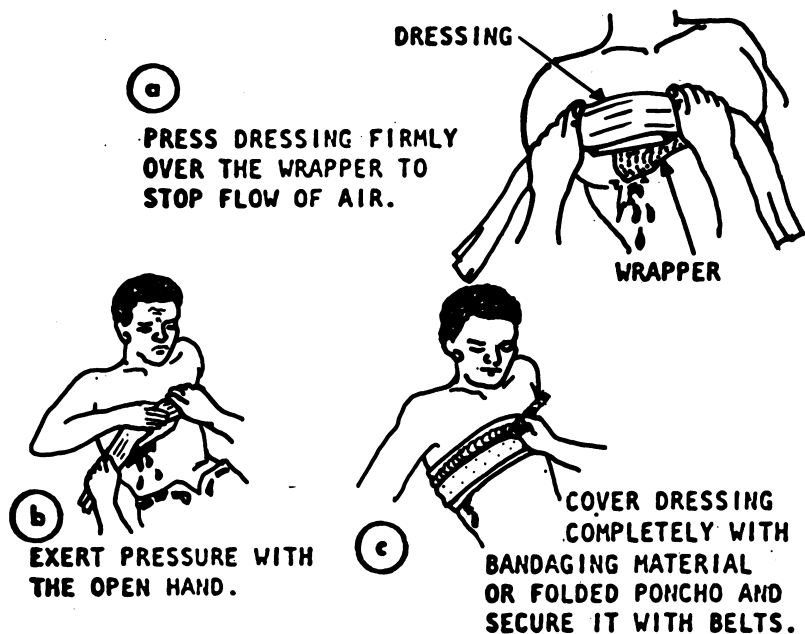


Figure 1. Sealing an open chest wound.

5. Check Airway for Difficult Breathing. Check the airway to see if the casualty is breathing easily. If breathing is still difficult, recheck the seal and bandage to insure their effectiveness.

6. Position Casualty. An unconscious casualty is placed in a side-lying position with the injured side down to ease pain and to assist breathing. If casualty is conscious, allow him to sit, lean back, or lie on the injured side to ease pain and assist breathing.

7. Get casualty to medical treatment facility as soon as possible.

REFERENCE:

FM 21-11, First Aid for Soldiers, Jun 76

081-831-1018

ADMINISTER FIRST AID FOR INSECT STINGS AND SPIDER BITES

CONDITIONS:

Given a victim with an insect sting or a spider bite, ice if available, soap and water if available, knife if available.

STANDARDS:

Administer first aid as described in the performance measures below.

PERFORMANCE MEASURES:

1. Bee, Wasp, Scorpion, and Fire Ant Stings.
 - a. Keep the victim as quiet as possible.
 - b. Remove the stinger by scraping gently across the sting site with a knife blade or fingernail. This step applies only to honeybee stings since other stinging insects normally do not leave their stingers.
 - c. Wash the affected area with soap and water to help prevent infection.
 - d. Apply ice to the affected area to decrease absorption of the poison and help relieve pain.
 - e. If signs of allergic reaction are evident (anxiety, itching, skin rash, swelling around the eyes and mouth, headache, weakness, breathing difficult, and abdominal cramps), evacuate the victim to a medical treatment facility without delay.
 - f. If breathing becomes difficult, maintain an open airway and perform mouth-to-mouth resuscitation if necessary.
2. Black Widow and Brown Recluse Spider Bites.
 - a. Keep the victim as quiet as possible.

FM 31-11C-S

b. Wash the affected area with soap and water to help prevent infection.

c. Apply ice to the area to help keep the venom from spreading and to help relieve pain.

d. Determine, if possible, whether a black widow spider inflicted the bite so the proper treatment can be administered by the medical facility.

e. Evacuate the victim to a medical treatment facility.

REFERENCE:

FM 21-11, First Aid for Soldiers, Jun 76

113-573-4001

ENCODE AND DECODE MESSAGES USING A
KTC-600 TACTICAL OPERATIONS CODE

CONDITIONS:

Given dates and times, CEOI, tactical operations code KTC-600, and a message to be encoded or three-letter code groups to be decoded.

STANDARDS:

Encode or decode the message, without error, within 30 seconds per code group or word/phrase.

PERFORMANCE MEASURES:

1. Use of Code Sets. Each set of the KTC-600 tactical operations code is effective for a given time frame, not to exceed 48 hours. Time of change will be directed in the CEOI (could be days of the month or days of any given operation). Sets are used as follows:

EXAMPLE ONLY

SET	EFFECTIVE DAYS (of the month or operation as directed by the CEOI)
1	1 and 2
2	3 and 4
3	5 and 6
4	7 and 8

2. To Encode.

a. After writing out your message in plaintext, turn to the code set used on that day (see example above; on the fifth day of the month (or operation), you would use set 3).

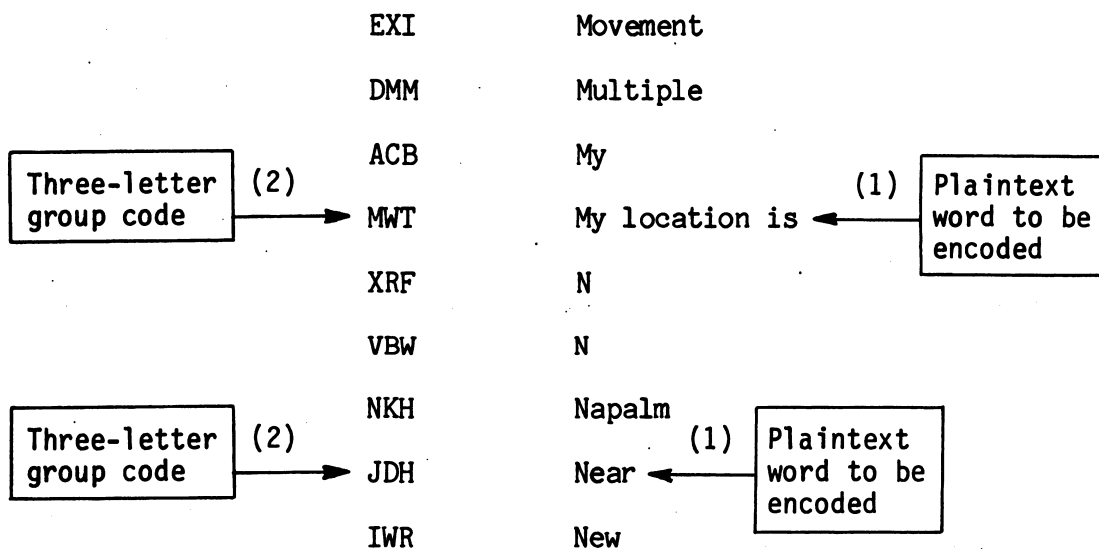
b. The encoded portion of the operations code is made up of words and phrases commonly used in tactical operations which are arranged in alphabetical order as in a dictionary. To the left of each is a three-letter code group which is the code for that word or phrase.

c. Procedure to encode words or phrases:

- (1) Find the word or phrase to be encoded.
- (2) Identify the three-letter code group located to the left of that word or phrase.
- (3) Write that three-letter code group under the word or phrase where you have written out the message to be encoded.
- (4) Repeat this procedure until the whole message is encoded.

(EXAMPLE ONLY)

Message: "My location is near."



My location is near.

MWT JDH

NOTE: Two code groups are provided for spelling a word that contains double letters. Do not use identical code groups side by side when you are spelling a word that contains double letters.

3. To Decode.

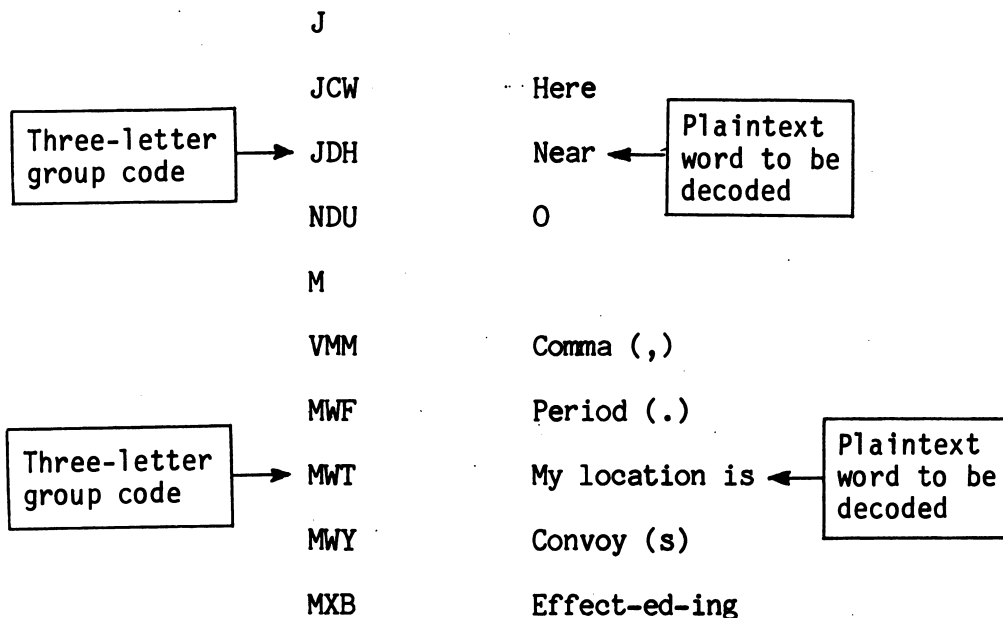
a. After receiving and writing down the encoded message, check the CEOI and turn to the code set in effect for that day.

b. The decode portion of the operations code is made up of a column of three-letter code groups in alphabetical order (AAO, ABL, ABY, etc.) with a word or phrase to the right of each group.

c. To decode a received message, find the code group and write the word/phrase next to it under that group in the encoded message which you copied.

(EXAMPLE ONLY)

Coded Message: "MWT JDH"



MWT JDH

My Location is near.

NOTE: You can save some time when encoding or decoding by going in alphabetical order. When encoding, look up all words/phrases starting with A, then B, etc. When decoding, look up all code groups beginning with A, then B, etc.

4. Radio Procedure.

a. After contact is established, the station sending the encoded message uses the following prowords/procedures:

(1) "Message." Lets the receiving station know that a message is going to be sent THAT REQUIRES RECEIVING STATION to copy.

(2) "Groups." The number of groups in the message is provided so that the receiving station can check his copy. The receiving station should write this number down.

(3) Groups are transmitted phonetically (that is, each letter is pronounced as a word, as given in the military phonetic alphabet). Transmission should be slow, with a pause between each group.

EXAMPLE: If station F07 is going to transmit the message, "Execute plan B" to station F26 and the encoded message is "BCA ONM ZYX," the transmission would be: (--indicates a pause)

(sending station) "FOXTROT TOO SIX--THIS IS FOXTROT ZERO SEVEN--MESSAGE--OVER"

(receiving station) "FOXTROT TOO SIX--OVER"

(sending station) "GROUPS THREE--"

BRAH-VOH CHAR-LEE AL-FAH

--OSS-CAH NO-VEM-BER MIKE

--ZOO-LOO YANG-KEY ECKS-RAY

--OVER

b. After the message is received and copied, and before it is decoded, the following procedures and prowords may be used:

(1) "Interrogative groups." Used by the receiving station when his group count is not the same as the sending station told him it would be. The receiving station's group count follows the word "groups."

(2) "Correct, out." Used by the sending station when the receiving station's interrogative group count is correct.

(3) "Groups" followed by a series of phonetic letters. Used by the sending station when the interrogative group count is wrong. The right group count follows the word "groups," and the first letter of each group is sent again. The receiving station checks these letters against the message he copied and finds his mistake.

(4) "Say again." Used by the receiving station to ask the sending station to retransmit a group(s) not received. The number of the group missed is put in the blank. (Example: "Say again five" means that the sending station should resend the fifth group in the message.)

c. Once the message has been decoded and a word (or all of the message) does not make sense, the receiving station should--

(1) Check to see if he has used the right code set.

(2) If the right code set was used, the receiving station should recontact the sending station and have him check the code group (or message) by using the proword "verify." (Examples: "Verify ONM" if ONM when decoded does not make sense; or "Verify message" if the whole message does not make sense.) The sending station then encodes and sends that portion again.

NOTE: Each set in the operations code has "spares" assigned. These spares can be used if all stations are informed of their meaning in advance. A word not included in the code or an entire message may be assigned to a "spare" group, or be spelled out using the letters listed in the operations code for that set.

REFERENCES:

TEC Lesson 936-061-0109-F, RTP Part 2, Writing Down Messages Received by Radio

TEC Lesson 936-061-0111-F, RTP Part 4, Preparing Messages To Be Sent

TEC Lesson 936-061-0112-F, RTP Part 5, Sending and Receiving Messages

NOTE: This instruction is not classified insofar as explaining encoding and decoding messages.

113-573-4002

USE KAL 61B KTC 1400 NUMERICAL CODE TO
AUTHENTICATE TRANSMISSIONS AND
ENCRYPT/DECRYPT NUMBERS AND
GRID ZONE LETTERS

CONDITIONS:

Given dates and times, a KAL 61B with KTC 1400 tables, pencil, paper, and the following items which may be simulated for training only: operational FM radios, a frequency, call signs, and a sending station.

Situation 1: A contacted station which might be an imposter.

Situation 2: A station requests you to authenticate two phonetic letters.

Situation 3: A requirement to encode specific grid coordinates and transmit them within an otherwise clear text (uncoded) message.

Situation 4: A station, while transmitting, says the words "I set" followed by 8, 10, or 12 phonetic letters.

STANDARDS:

Without error, select the right KTC 1400 for the time period given:

Situation 1: Within 15 seconds (not including time taken by the other station), transmit, using proper radio procedure, a two-letter challenge, and from the reply determine whether or not the station responded correctly. (If station takes more than 5 seconds to respond, challenge again.)

Situation 2: Within 15 seconds, using the correct radio procedure, respond to the challenge with correct authentication. (If immediately challenged again, respond correctly within 5 seconds.)

Situation 3: Encode the specific grid coordinates without error and transmit them using correct radio procedures.

Situation 4: Decode the words after "I set" without error.

PERFORMANCE MEASURES:

NAO 3B

TO SET UP FOR ENCRYPTING

Step 1. Randomly select any two letters (except Z) for message "SET INDICATOR" (SI). EXAMPLE: CP.

Step 2. Find the first letter "C" of the SI in LINE INDICATOR COLUMN (1).

Step 3. Find the second letter "P" of SI in the line indicated by the first letter. Letter to the right of second SI letter is the SET LETTER.

NOTE: If the second SI letter is the last letter in the line, then the first letter in the same line will be the SET LETTER.

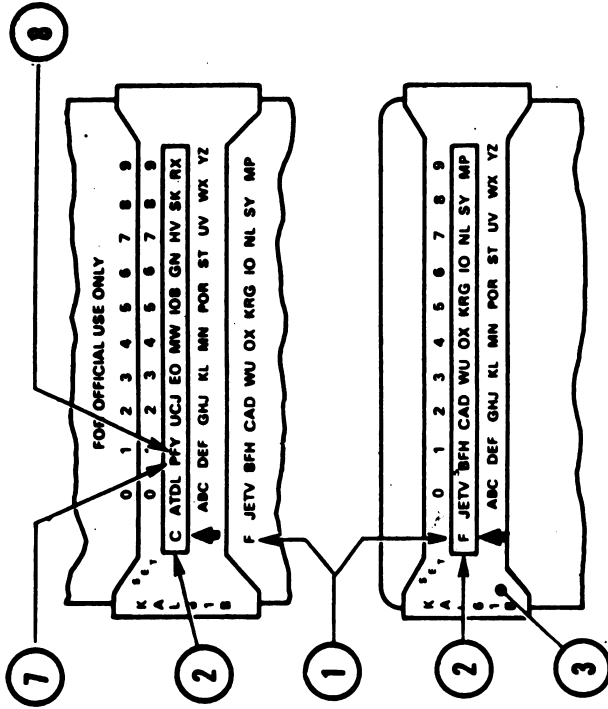
Step 4. Find SET LETTER "F" in LINE INDICATOR COLUMN.

Step 5. Position READER GUIDE over line indicated by SET LETTER "F". Device is now ready for encrypting.

1. TO SET UP FOR ENCRYPTING.

(PROTECTIVE MARKING)

NAO 3B



KAL 61 set up for encrypting.

1. Line Indicator Column
2. Set Letter/First Letter of Set Indicator
3. Reader Guide
7. Second Letter of Set Indicator
8. Set Letter

(PROTECTIVE MARKING)

NAO 3B

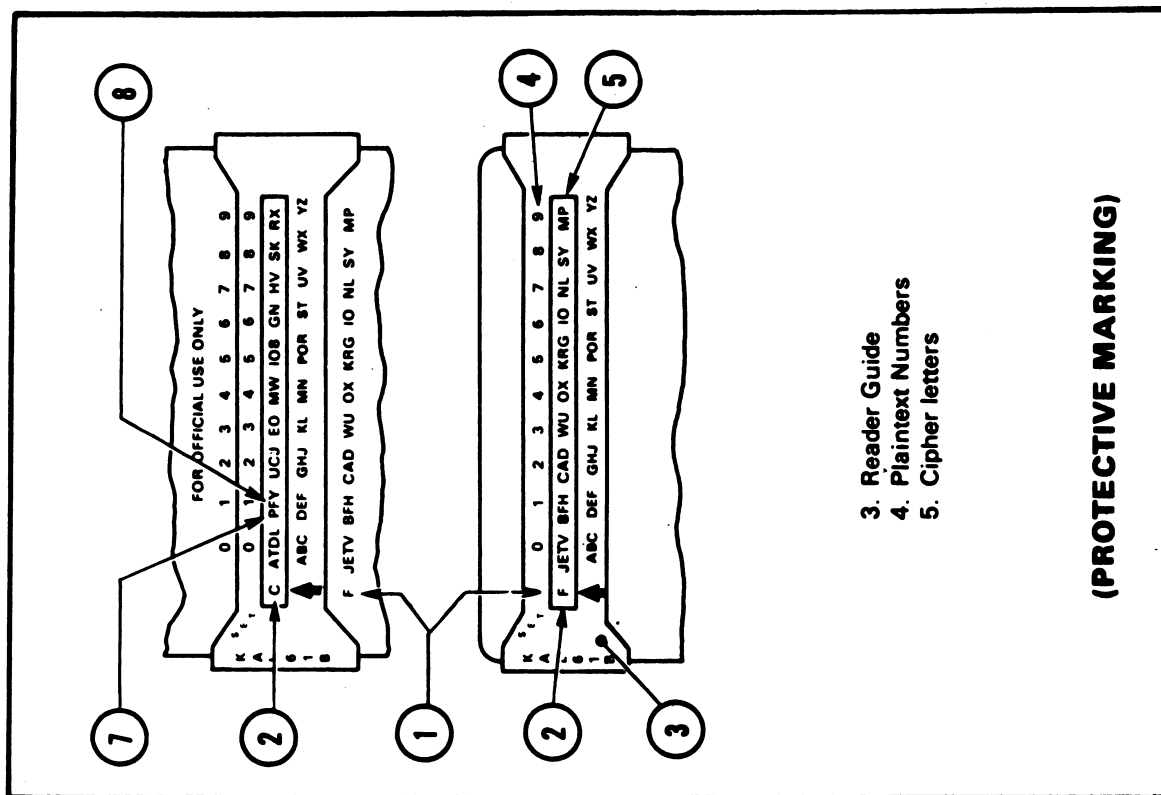
TO ENCRYPT NUMBERS

Set KAL 61 for encrypting as indicated in Section 1.

Step 1. Find number to be encrypted in **PLAINTEXT NUMBERS (4)** on **READER GUIDE (3)**. **EXAMPLE:** 572938.

Step 2. Substitute for each number one of the **CIPHER LETTERS (5)** grouped in the set line immediately below the number to be encrypted. Continue to substitute letters from the same SET line until all numbers for that group are encrypted. **EXAMPLE:** RNAMUS is one possibility. By using variants, others are possible.

NOTE: Numbers will be encrypted one at a time in the same order they appear in the message. A different cipher letter will be used for repeated numbers. If there are more than 15 numbers to be encrypted in the same message, one SET INDICATOR will be used for the first 15 numbers and a different SET INDICATOR for each succeeding group of 1 to 15 numbers. This must be done because the encrypting of more than 15 numbers in the same SET INDICATOR can seriously weaken the security of the system.

2. TO ENCRYPT NUMBERS.**(PROTECTIVE MARKING)**

- 3. Reader Guide
- 4. Plaintext Numbers
- 5. Cipher letters

(PROTECTIVE MARKING)

NAO 3B

TO ENCRYPT GRID ZONE LETTERS

Step 1. Find first grid zone letter to be encrypted in PLAINTEXT LETTERS (6). EXAMPLE: N.

Step 2. Substitute for that letter the cipher letter located in SET line directly above the letter to be encrypted. EXAMPLE: X.

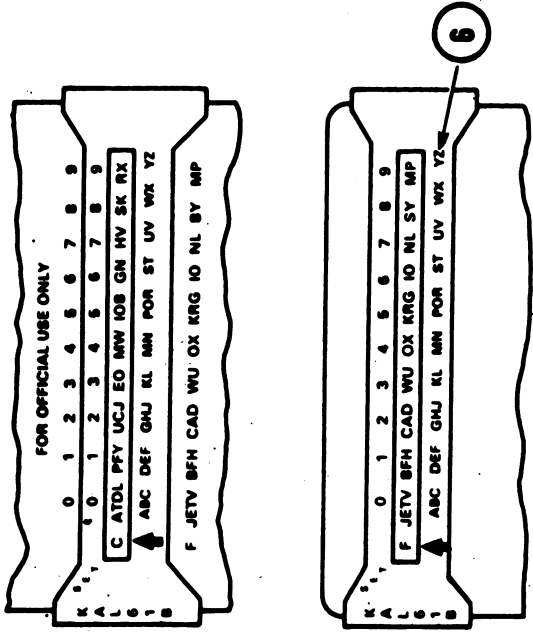
Step 3. Find the second grid zone letter to be encrypted in PLAINTEXT LETTERS (6). EXAMPLE: R.

Step 4. Substitute for second letter the cipher letter located in SET line directly above the letter to be encrypted. EXAMPLE: G. The same SET line will be used to encrypt both the grid zone letters and the coordinates.

NOTE: Grid Zone letters will be included in messages when they are necessary to the understanding of such messages. NO OTHER LETTERS WILL BE ENCRYPTED. If necessary to preclude misunderstanding, a statement may be made that grid zone letters are included in the message.

3. TO ENCRYPT GRID ZONE LETTERS.

(PROTECTIVE MARKING)



6. Plaintext letters for UTM Grid Zone Designators

(PROTECTIVE MARKING)

NAO 3B

ARRANGEMENT AND TRANSMISSION OF MESSAGES

This system is designed to be used with plain text. Therefore, most messages using this system will include both encrypted portions and plaintext portions. The encrypted portions of your message will be arranged as follows:

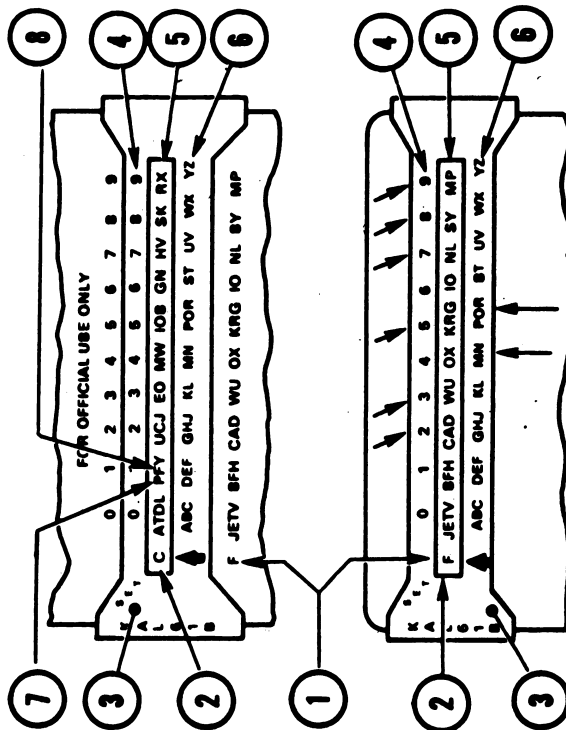
- a. First two letters will be the SET INDICATOR letters. (NEVER TRANSMIT THE SET LETTER). EXAMPLE: CP. (This is transmitted as "I set CHARLIE PAPA".)
- b. If grid zone letters are included, the third and fourth letters will be encrypted grid zone letters. EXAMPLE: XG. (This is transmitted as "X-RAY GOLF".)
- c. Remaining letters (including third and fourth if grid zone letters are not included) will be encrypted numbers. EXAMPLE: RNAMUS. (This is transmitted "ROMEO NOVEMBER ALFA MIKE UNIFORM SIERRA".)

NOTE: An encrypted, six-digit location which includes grid zone letters will consist of ten letters, including the SI which is always the first two letters. The entire encrypted location would be transmitted as "I set CHARLIE PAPA, (pause), X-RAY GOLF ROMEO NOVEMBER ALFA MIKE UNIFORM SIERRA".

4. ARRANGEMENT AND TRANSMISSION OF MESSAGES

(PROTECTIVE MARKING)

NAO 3B



1. Line Indicator Column
2. Set Letter/First Letter of Set Indicator
3. Reader Guide
4. Plaintext Numbers
5. Cipher Letters
6. Plaintext Letters for UTM Grid Zone Designators
7. Second Letter of Set Indicator
8. Set Letter

(PROTECTIVE MARKING)

NAO 3B

TO DECRYPT

Example encrypted location: CP XG RNAMUS. (Transmitted as, "1 set CP (pause) XG RNAMUS".)

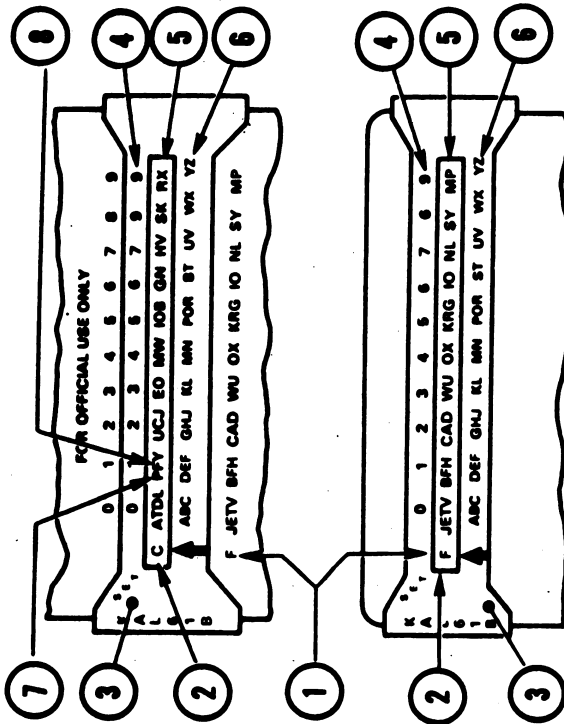
Step 1. Find SET LETTER "F" using the SI "CP" as described in "TO SET UP FOR ENCRYPTING" Steps 2 and 3.

Step 2. Decipher message beginning with the third letter "X" by substituting plaintext letters/numbers on the READER GUIDE (3) for the cipher letters.

5. TO DECRYPT

(PROTECTIVE MARKING)

NAO 3B



1. Line Indicator Column
2. Set Letter/First Letter of Set Indicator
3. Reader Guide
4. Plaintext Numbers
5. Cipher Letters
6. Plaintext Letters for UTM Grid Zone Designators
7. Second Letter of Set Indicator
8. Set Letter

(PROTECTIVE MARKING)

NAO 3B

NOTE: AUTHENTICATION MAY BEST BE ACCOMPLISHED BY MOVING READER GUIDE COMPLETELY OUT OF THE WAY OR ELSE POSITIONING IT SO AS NOT TO OBSCURE REPLY LINE.

TO AUTHENTICATE

Challenge and Reply

Step 1. Select any two letters (except Z) at random for challenge. **EXAMPLE:** KV.

Step 2. Find first letter "K" of challenge in the LINE INDICATOR COLUMN.

Step 3. Find second letter "V" of challenge in line indicated by first letter. The correct reply (E) is the cipher letter directly under the second letter "V" of the challenge.

NOTE: If the first letter of the challenge is "Y" indicating the last line of the table, the reply should be taken from the "A" line and will be the letter in the same position as the second letter of the challenge in the "Y" line. If challenged party does not reply within 5 seconds but does reply correctly, challenge that party again using a different challenge.

(PROTECTIVE MARKING)

NAO 3B

NOTE: The called party will make the first challenge. Both the person making the challenge and the person being challenged must find the correct reply. The party making the call may then counter-challenge the called party using a different challenge.

Transmission Authentication

One hundred Transmission Authentication digraphs have been provided in this system. They are to be used in cases where authentication is required and it is not possible or desirable that the receiving station reply. The Transmission Authentication table consists of ten numbered columns containing ten digraphs each. Columns have been numbered to make the assignment of Transmission Authentication digraphs easier. Numbered columns should be assigned by the Controlling Authority to selected communications nets within his cryptonet. Authentication digraphs within the numbered columns should be used only once, and only within the Controlling Authority's net. When it becomes necessary to use Transmission Authentication, the first or next unused digraph in the assigned column will be used.

6. TO AUTHENTICATE.

(PROTECTIVE MARKING)

NAO 3B

A	0	VDFJ	AUM	1	IHC	2	EL	3	EL	4	XW	5	YNO	6	GT	7	OK	8	PS	9	RB
B	C	CIFN	WKV	BDQ	ES	RH	XL	AT	UG	PM											
C	D	QSQJ	CFY	QGD	RT	UA	VIN	YU	WV	LB											
D	E	IOBS	JKQ	FEG	DP	MN	XWL	CH	CW	RY											
E	F	KLPA	MJX	QDY	DP	CH	VFE	BT	RN	OS											
F	G	VUCI	EPA	QDY	TH	BQ	OGJ	LK	WR	DS											
G	H	NYAO	UFC	GJW	TH	QI	DT	BLH	ES	PM											
H	I	KHIV	GYC	RPS	FO	JX	QWA	TU	DB	NL											
I	J	BWOA	DPJ	UGY	NH	RE	VCI	TS	LM	KX											
J	K	PCWX	QOF	JVM	OY	IS	EGD	BN	KT	IL											
K	L	QOPK	ASM	TDJ	WX	IH	NUR	GB	OL	VF											
L	M	BWRF	JPC	QON	AV	HG	IML	DU	SK	ET											
M	N	HOIA	XLC	FVB	SK	OJ	MUD	RW	YN	TP											
N	O	QWQF	KJS	XHP	AE	TN	UGY	VL	MD	OB											
O	P	NWFD	QBS	RJX	PH	YT	ICM	OG	AV	KE											
P	Q	PAFT	NSC	DGR	QM	WY	HKI	OE	YJ	LV											
Q	R	SNGD	JTP	WYI	CR	BE	UOV	MX	FH	OK											
R	S	AMRH	NJG	QUY	SE	IO	KDL	PV	XC	LA											
S	T	YWGS	VXE	IDC	KQ	OA	TPH	BU	JR	FT											
T	U	BCDL	FOR	AUT	NV	GW	SXK	PI	ME	NF											
U	V	RMQD	WVS	YJX	TG	UL	FEK	PB	OA	JY											
V	W	BOKA	HXG	SLC	PD	BE	CI	PFX	HG	IC											
W	X	ASLW	YVD	TRO	BE	CI	EFQ	IV	WM	UY											
X	Y	DLTV	NEQ	PAS	XB	OC	MHJ	KW	RF	KU											
Y		XSIC	YGP	NFW	HE	KL	JAR	VO	QD	YU											

DAY 17

KTC 1400 A

7. SAMPLE TABLE

(PROTECTIVE MARKING)

NAO 3B

SECURITY THOUGHTS

Following are common rules to achieve security:

- Change message set after 15 numbers are encrypted.
- Encrypt brevity values.
- Never encrypt or decrypt a message and then repeat it in plain language.
- Avoid the encrypting of information known to the enemy.
- Make all transmissions as short as possible.
- Remember that anyone can listen to your transmission.

INSTRUCTIONS FOR INSERTING CIPHER TABLE

IN KAL 61

- Unfasten flap at the bottom of device and bend back out of the way.
- Slide the cipher table face up under the lips at the top and sides of the device.
- Before refastening the flap, adjust cipher table so that the top register marks (+) at the bottom of the table will align precisely with the snaps when the flap is fastened.

TRANSMISSION AUTHENTICATION TABLE

01	02	03	04	05	06	07	08	09	10
HA	VX	YM	WT	MP	OV	XI	TX	TF	WE
DM	VB	ZF	OL	MA	SS	JZ	SG	XJ	EX
JP	YQ	OR	IS	BM	HN	HM	VN	HW	ZK
NK	UD	FU	CM	YF	YN	HM	NF	VK	EG
OD	CC	WA	UF	QC	OQ	MW	GD	CD	XA
SW	MQ	OP	ES	YL	ZY	SV	IB	AR	ZL
RG	KM	RL	GO	OF	OK	BX	II	ND	EA
MM	OH	OK	RZ	NE	ZT	AN	FG	GB	PB
IF	DC	UV	SB	FA	VZ	MD	BD	XE	HR

DAY 23

KTC 1400

(PROTECTIVE MARKING)

NOTE: NEVER self-authenticate using challenge and reply authentication. If self-authentication is required, use one of the two letter digraphs found in the Transmission Authentication Table (KTC 1400) assigned to your unit.

REFERENCE:

NONE

113-573-8001

USE AN AUTOMATED CEOI

CONDITIONS:

Given an extract of the division Communications-Electronics Operation Instructions (CEOI) and directions to determine, for a specified time period, any or all of the following:

- a. The frequency(s) of specified unit nets.
- b. The call sign(s) of station(s) within a given net.
- c. Your own item number identifier.
- d. Another station's identity, given its item number identifier.

STANDARDS:

1. Within 2 minutes (for each station), determine the complete individual call sign (to include suffix) assigned by the CEOI to that station for the time period specified, and state (or show) it to your supervisor.
2. Within 1 minute (for each net), determine the frequency assigned by the CEOI to that unit for the time period specified, and state (or show) it to your supervisor.
3. Within 2 minutes, determine your own item number identifier as given in the CEOI for the time period specified.
4. Within 2 minutes, determine an unknown station's unit identity.

PERFORMANCE MEASURES:

1. General:
 - a. The CEOI contains specific instructions for the operation of communication systems under a division headquarters--and is the only authorized document from which

subordinate elements will extract information to compile organization/unit CEOIs--for use during tactical training and contingency operations.

b. Call signs, suffixes, and frequencies will be changed simultaneously during each time period throughout the division. Specific call sign and frequency assignments will be transmitted in the clear over nonsecure means of communication. If such transmission is required, the call sign and frequency must be encoded using the current tactical unit operations code or numeral/cipher authentication system. All information is listed according to time periods. When determining call signs and frequencies, be sure you look under the correct time period. (Your supervisor can explain the local time period designation procedure that you should use.)

2. To Determine Call Signs: To find the call signs for a given element (for example: 1/77 Inf, A Co, 1st Plt Ldr), turn to the index (fig. 1a) of the CEOI. Follow the left-hand column of items until you find the parent unit (e.g., 1/77 INF BN). Next, look across from the parent unit to the right-hand column under the item number heading to find the correct item number (6A) and turn to that item number (fig. 2a). Determine the correct time period (01) and look down the column headed by the time period to find the call sign for 1/77 Inf, A Co, 1st Plt (J1M). Then, go back to the index (fig. 1a) and find the item number for suffixes (item No. 2). Turning to that item number (fig. 3), find PLT LDR. Located to the left of PLT LDR is its two-digit suffix (13). Combining the call sign (J1M) with the suffix (13) gives you the complete five-character call sign for the Plt Ldr, 1st Plt, A Co, 1/77 Inf Bn (J1M13).

3. To Determine Frequencies: Frequencies are assigned to each unit according to command echelon. To find the frequency for a given net (for example: 1/77 Inf, A Co, 1st Plt), turn to the index (fig. 1a) and find the parent organization item number, as in paragraph 2 above. Turn to that item number (fig. 2b) and look down the left-hand column until you find the unit you want to communicate with (A Co, 1st Plt). After finding the unit, look to the right under the correct time period (01) to find the right frequency (52.45).

4. Item Number Identifiers. Unknown station call signs can be identified by the use of item number identifiers. Each station should know the two-letter identifier for its own net for each time period. To find your item number identifier, follow these steps:

Step 1. Go to the index of your CEOI and find item numbers for both your unit and ITEM NUMBER IDENTIFIERS.

Step 2. Turn to the correct item number for ITEM NUMBER IDENTIFIERS and read down the column under the appropriate time period until you find your unit's CEOI item number. Next, follow that line to the far left column to find your correct two-letter ITEM NUMBER IDENTIFIER. Use this number to identify yourself when entering a net in which you do not normally operate. This gives the other net your CEOI item number from which your station's identity can readily be determined.

Example:

You have just received a call from an unknown station. The individual identified himself using the call sign S9A17 and stated that his item number identifier is AB. The time period is 01, and the individual authenticated correctly when you challenged him. To identify the unknown station, follow this procedure:

Step 1. Go to your index (fig. 1b) and locate the item number for ITEM NUMBER IDENTIFIERS (20). Turn to item number 20 (fig. 4), and look down the left-hand column until you find the two-letter identifier, AB. Next, follow this line across the page to the column of item numbers under the correct time period (01) and read the item number of the unknown station (6A).

Step 2. Turn to the CEOI item number (6A) (fig. 2a). Look under the correct time period (01) for the first three characters of the unknown call sign (S9A). Reading over to the left-hand column, you find this to be the 1/77 INF BN.

Step 3. To identify the last two characters of the unknown station call sign (17), go to the CEOI item for suffixes (2) (fig. 3). Look down the left-hand column until you find the number 17. Read to the right to identify the unknown station as an S2.

In this manner, you have completely identified the unknown station as the S2, 1/77 INF BN.

NOTE: The CEOI extract and the performance measures section under the task USE KAL 61B KTC 1400 NUMERICAL CODE TO AUTHENTICATE TRANSMISSIONS AND ENCRYPT/DECRYPT NUMBERS AND GRID ZONE LETTERS may be cut out and used as a training CEOI.

(PROTECTIVE MARKING)		
KTC 600 Series	INDEX	1
ITEM		ITEM NO
INDEX		1
SUFFIXES		2
CDR QUICK REF MAJOR SUBOR ELMS AND CBT BNS		
CALL SIGNS AND FREQS		3
CDR QUICK REF DIV AND SUPPORT		3A
CDR QUICK REF 1ST BDE		3B
CDR QUICK REF 2ND BDE		3C
CDR QUICK REF 3RD BDE		3D
CDR QUICK REF DIVARTY		3E
CDR QUICK REF DISCOM		3F
CDR QUICK REF RATT		3G
CDR QUICK REF SSB VOICE		3H
52ND INF DIV (MECH) CALL SIGNS AND FREQS		4
DIV ADMIN		4A
DIV OPS INTEL RATT		4B
DIV ADMIN LOG RATT		4C
DIV TOC SSB VOICE		4D
ATC CALL SIGNS AND FREQS		5
1ST BDE CALL SIGNS AND FREQS		6
1-77 INF BN		6A
1-78 INF BN		6B
1-2 ARMD BN		6C
1ST BDE RATT		6D
2ND BDE CALL SIGNS AND FREQS		7
1-79 INF BN		7A
INDEX	1 of 4	1

Figure 1a

(PROTECTIVE MARKING)		
KTV 600 Series	INDEX	1
ITEM		ITEM NO
1-441 ADA BN CALL SIGNS AND FREQS		12
FAAR PLT		12A
1-441 ADA BN SSB VOICE		12B
52ND ENGR BN CALL SIGNS AND FREQS		13
52ND ENGR ADM PLT SSB VOICE		13A
52ND MP CO CALL SIGNS AND FREQS		14
52ND MI CO CALL SIGNS AND FREQS		15
52ND SIG BN CALL SIGNS AND FREQS		16
52ND AVN BN CALL SIGNS AND FREQS		17
AHC 52ND AVN BN		17A
AHC PLT'S		17B
GEN SPT CO 52ND AVN BN		17C
52ND ASA CO CALL SIGNS AND FREQS		18
52ND ASA CO RATT		18A
SPARE CALL SIGNS AND FM FREQS		19
SPARE CALL SIGNS AND FM FREQS		19A
SPARE CALL SIGNS AND VHF FREQS		19B
SPARE CALL SIGNS AND UHF FREQS		19C
SPARE CALL SIGNS AND HF FREQS		19D
ITEM NUMBER IDENTIFIERS		20
PYROTECHNIC AND SMOKE SIGNALS		21
SIGNS AND COUNTERSIGNS		22
INDEX	3 of 4	1

Figure 1b

(PROTECTIVE MARKING)					
KTV 600B	CALL SIGNS				
1-77 INF BN	01	02	03	04	05
1-77 INF BN	59A	I2L	P9T	Z1N	I3L
HMC	B7J	G8X	K4H	O3E	K4C
A Co	M1C	R4M	N3X	T1K	K7X
1ST PLT	J4M	K2J	V6N	G8L	F1G
2ND PLT	V7D	R8O	EOP	K2W	W2R
3RD PLT	D2H	W5K	K1J	G5M	D5P
MORTAR PLT	C4B	J2A	P7K	E5Y	F5W
B CO	Y6Y	P0Z	L0Q	K6R	C6J
1ST PLT	P0F	B6R	X1A	P1U	R2N
2ND PLT	S2X	H7H	V8I	Y7C	G2V
3RD PLT	L7T	L7Q	Q7V	S5A	I4Z
MORTAR PLT	R9V	B7W	D1S	P7D	B2B
C CO	G1Q	J6N	E6F	M4B	A0T
1ST PLT	N7O	P9U	B6B	N5V	P7U
2ND PLT	B9S	Y6D	K2R	R7O	I6Y
3RD PLT	H8P	P7I	Z6L	B4Q	T1I
MORTAR PLT	A5L	Q2C	A8E	Y8F	V6D
CSC	COW	O4B	N7C	O6H	S4H
AT PLT	A2E	N9P	E4W	N2G	L6E
MORTAR PLT	J6Z	U2G	U8G	Q5Z	W0M
RECON PLT	E4G	B6F	R0Z	D0T	E8S
REDEYE SEC	J7I	Z0S	A6O	Q6J	U1K
GND SURVL SEC	G5U	L2Y	T8D	F1I	U4O
MEDEVAC	Q6J	A6I	V2S	W0P	O2O
1-77 INF BN					0A

Figure 2a

(PROTECTIVE MARKING)					
KTV 600 B	FREQUENCIES				
1-77 INF BN	01	02	03	04	05
1-77 INF CMD	52 800	61 950	35 050	61 550	60 700
1-77 INF A L	49 300	64 200	31 500	39 250	41 200
A CO CMD	35 950	40 600	35 550	34 600	30 250
1ST PLT	52 400	52 550	47 900	53 150	51 700
2ND PLT	53 100	52 500	52 050	52 750	50 850
3RD PLT	47 500	53 450	52 350	52 550	52 150
MORTAR PLT	71 450	56 450	59 450	68 050	70 650
B CO CMD	44 850	56 750	71 850	55 200	56 250
1ST PLT	53 350	52 650	50 950	53 350	53 750
2ND PLT	50 150	48 800	53 100	52 350	52 450
3RD PLT	53 650	52 050	53 700	50 950	48 050
MORTAR PLT	49 150	49 050	40 950	71 200	62 550
C CO CMD	56 150	66 850	54 750	49 850	45 550
1ST PLT	50 450	53 100	51 200	52 650	53 250
2ND PLT	52 550	48 100	52 950	53 100	50 650
3RD PLT	51 600	48 700	53 350	53 600	52 100
MORTAR PLT	56 600	55 850	47 950	45 800	43 300
CSC CMD	57 800	34 900	34 250	35 850	61 450
AT PLT	54 850	65 650	35 350	49 300	65 250
MORTAR PLT	46 450	58 900	64 200	61 300	68 550
RECON PLT	71 850	55 900	72 900	39 500	72 550
REDEYE SEC	46 250	36 400	73 000	45 150	75 900
GND SURVL SEC	39 600	41 700	58 200	73 000	47 700
1-77 AJ ALT 1	53 000	33 350	73 150	56 750	59 800
1-77 AJ ALT 2	40 050	71 500	59 000	73 300	65 800
MEDEVAC P	35 200	43 800	48 500	69 000	73 150
1-77 INF BN					0A

Figure 2b

(PROTECTIVE MARKING)		2
KTV 600 B	SUFFIXES TIME PERIOD 01	
01 TARGET ACQ OFF	31 TM SOD SEC DET TK 7	
02 AID DE CAMP	32 LN OFF 4	
03 C E OFF	33 TM SOD SEC DET TK 8	
04 MAINT OFF	34 ATSE	
05 AIRCRAFT 12	35 FO RECON TACP 6	
06 G3 S3 AIR	36 COMSEC OFF	
07 MATERIEL OFF	37 TRANS MOTOR OFF	
08 AVLB SEC	38 FSE	
09 G1 S1	39 EW OFF	
10 MET	40 CHIEF OF STAFF XO	
11 ASA OFF	41 SURGEON MED OFF	
12 FO RECON TACP 1	42 FO RECON TACP 5	
13 PLT SEC TEAM LDR	43 ACE	
14 AIRCRAFT 6	44 HQ COMDT	
15 FO RECON TACP 3	45 FDC	
16 FSCORD	46 TM SOD SEC DET TK 1	
17 G2 S2	47 AIRCRAFT 1	
18 AG	48 AME	
19 SURVEY OFF	49 RADAR	
20 FLT OPS	50 AIRCRAFT 10	
21 AIRCRAFT 8	51 AIR DEFENSE OFF	
22 RECOVERY VEH	52 CHAPLAIN	
23 G3 S3	53 AIRCRAFT 5	
24 IG	54 SPARE 9	
25 PLT SEC TEAM SGT	55 ENGR OFF	
26 LN OFF 3	56 NCS	
27 TOC CP	57 FO RECON TACP 2	
28 SGM CSM	58 AIRCRAFT 7	
29 G4 S4	59 SPARE 8	
30 NAICO	60 SPARE 2	
SUFFIXES	1 OF 20	2

Figure 3

(PROTECTIVE MARKING)		20
KTV 600 B	ITEM NUMBER IDENTIFIERS	
01	02 03 04 05 06 07 08 09 10	
AA 19A	3G 19A 13A 11A 7 9B 9F 13 15	
AB 20A	10B 9B 9A 12 19B 8C 7A 4 8A	
AC 3H	4C 19D 4D 6 3B 19B 14 9F 10D	
AD 8	12A 3F 7B 19D 7B 3A 19A 4D 10E	
AE 3A	4A 12A 3B 6C 10E 4D 10B 17B 3	
AF 3C	10A 3E 10E 9E 8E 6D 16 10D 19D	
AG 3E	4D 7 19D 11 16 3E 9C 11A 11	
AH 9F	13 10C 19A 15 3D 9D 8E 17A 3E	
AI 7	7C 8D 10C 10B 7D 4B 11B 7B 7A	
AJ 6	10C 13 6D 13A 9 5 13 7A 8B	
AK 18	3D 16 8A 17B 5 3B 3E 8C 6	
AL 17	10E 3 5 9A 9A 13 8C 4C 6B	
AM 10C	19C 10 9D 8C 8A 10C 7D 19C 11A	
AN 12	12 3D 10A 9C 4B 8B 4D 9C 18A	
AO 6B	19B 9A 10 12B 10D 10E 5 14 9F	
AP 8D	19 19 3D 3D 17B 3H 10E 9 17C	
AQ 9	8E 11A 9 9 14 11B 11 3E 19	
AR 7D	15 12 6 17A 19C 19C 3F 3F 9B	
AS 3G	9E 9 18A 5 11A 18A 18A 17C 3H	
AT 7C	7A 17 8D 10D 4D 9F 17A 9A 18	
AU 9B	3A 9F 6C 6A 3H 6A 9E 19A 12B	
AV 3F	3B 18A 12 3H 4 8A 9D 3D 16	
AW 19B	8C 8B 7A 7C 17A 7 15 6D 3C	
AX 10A	18A 14 8 17 8C 3F 19D 13A 17A	
AY 5	11A 7A 6A 8B 17 10 17 3 4A	
AZ 16	17B 4D 12A 3G 3C 3G 17B 19D 7D	
ITEM NUMBER IDENTIFIERS	1 OF 3	20

Figure 4

REFERENCES:

TEC Lesson 936-061-0140-F, CEOI, Part I: How To Use the CEOI

113-587-2001

OPERATE RADIO SET AN/PRC-77 OR AN/PRC-25

CONDITIONS:

Given a functional radio set (AN/PRC-77 or AN/PRC-25) with all parts, a frequency, call signs, another station within range (can be another radio operator requiring training), knowledge of how to make a radio check, and battery BA-4386. Entering a radio net is not required in this task.

STANDARDS:

Within 2 minutes, assemble the AN/PRC-77 or AN/PRC-25 and make a communication check with the other station.

PERFORMANCE MEASURES:

1. Assembly of Radio Set AN/PRC-77 (fig. 1) (TM 11-5820-667-12, chap 1, pages 1-2 thru 1-5). Inspect radio set to insure that all components are present:

- | | |
|----------------------------|----------------------------------|
| a. Electrical harness. | e. Handset. |
| b. Antenna, AT-892/PRC-25. | f. Cotton-duck bag. |
| c. Antenna, AT-271A/PRC. | g. Receiver-transmitter, RT-841. |
| d. Antenna support. | h. Battery BA-4386. |

2. Installation of Battery (fig. 2) (TM 11-5820-667-12, chap 2, page 2-4, para 2-4).

- a. Place radio on control guard and remove battery box.
- b. Do not install battery (BA-4386) until you are certain air vent in battery box works.

(1) Depress valve and blow from the outside; air should pass through the vent.

(2) Release the valve and blow; air should not flow.

- c. Check pressure relief valve before installing battery.

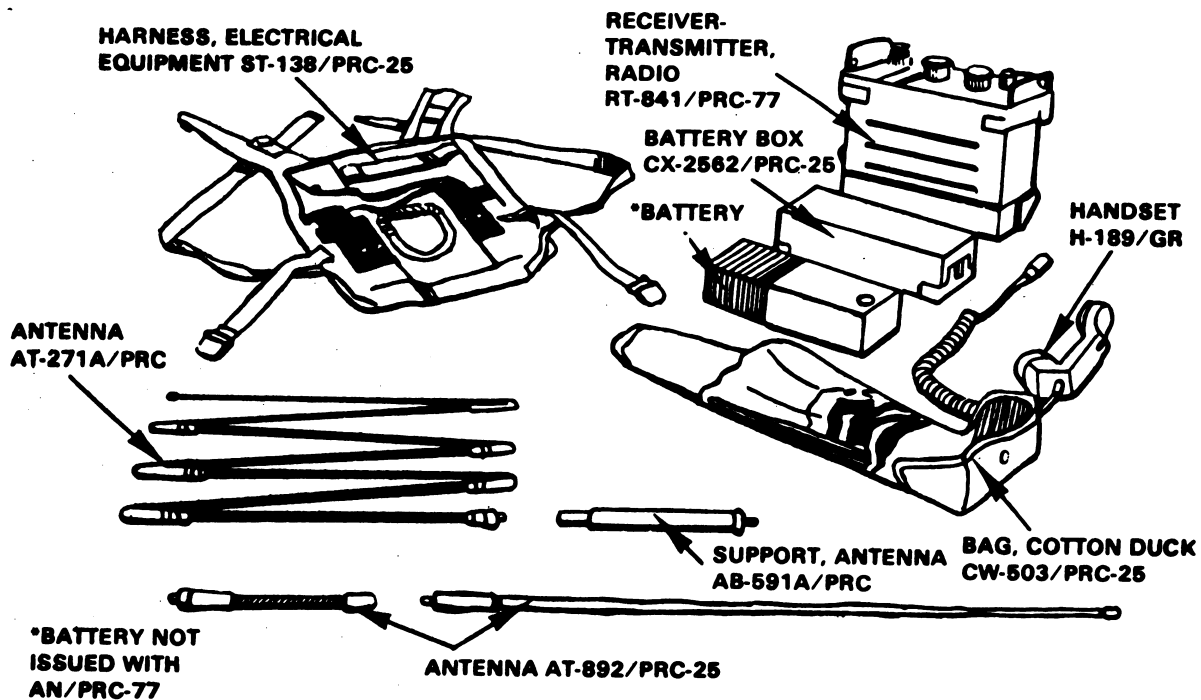


Figure 1. Components.

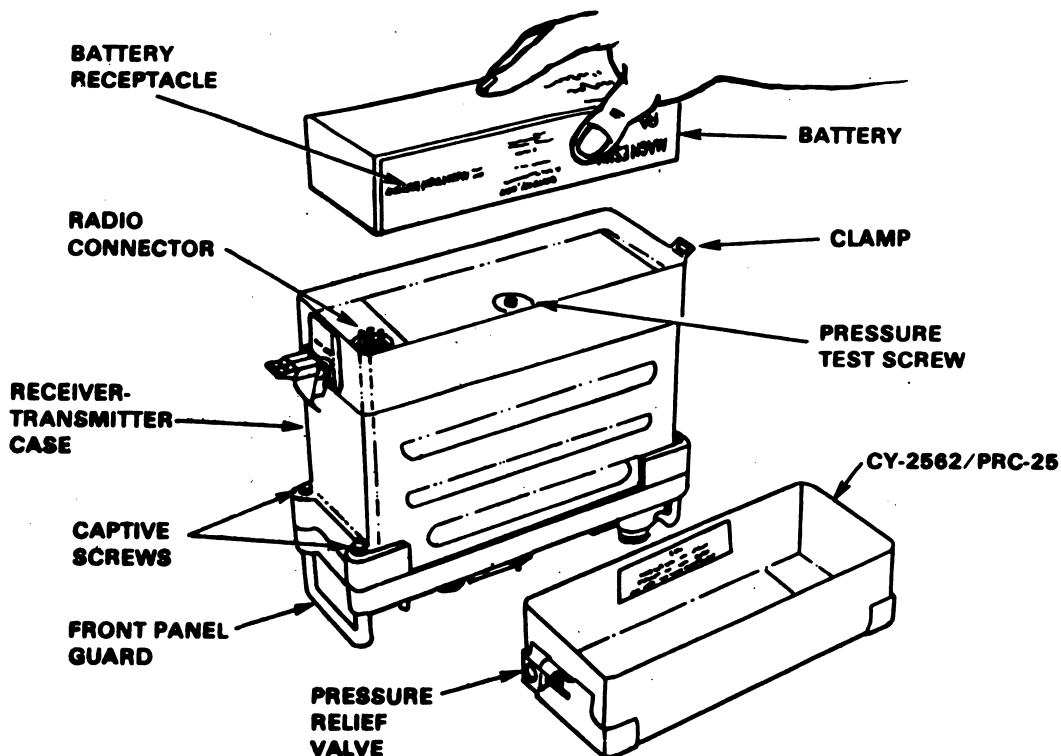


Figure 2. Installing battery in receiver-transmitter.

- d. Place battery in battery box as shown in figure 2.

CAUTION: Do not break floating connector.

- e. Replace battery box and close both latches at the same time.

3. To Operate Set (fig. 3) (TM 11-5820-667-12, chap 3, pages 3-1 thru 3-7).

- a. The numbers of steps 1 through 6 below relate to the numbers in figure 3.

- (1) Install the antenna required for the type of operation in the antenna mount.

- (2) Attach handset H-189/GR to either audio connector.

- (3) Turn the function switch to ON.

- (4) Turn the BAND switch to the desired operating frequency band.

- (5) Turn the MC tuning and KC tuning control knobs until desired frequency appears in the channel dial (7).

- (6) Turn the VOLUME control to 4.

- (7) Press the handset H-189/GR push-to-talk switch and speak into handset; release the push-to-talk switch to listen.

- (8) Adjust the VOLUME control (6) for a desirable sound level.

- (9) To reduce the rushing noise when no signal is being received, turn switch (3) to SQUELCH.

- b. Make a radio check with other stations.

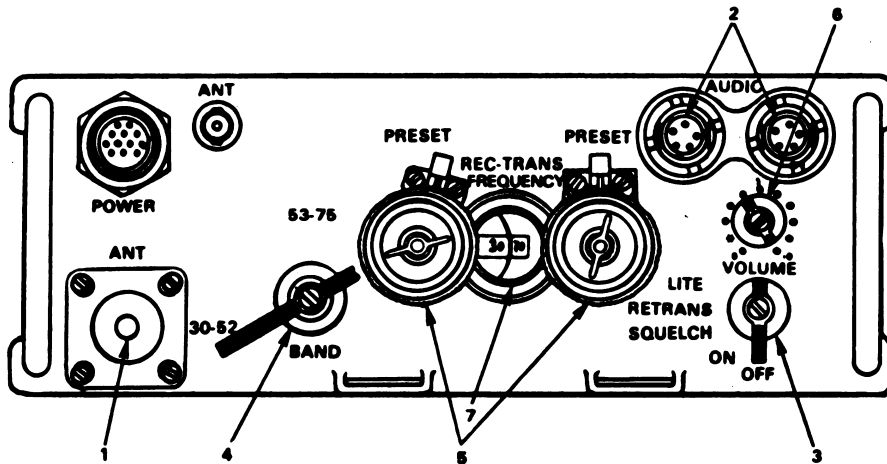


Figure 3

c. To turn set off: Turn the function switch (3) to OFF.

REFERENCES:

TM 11-5820-667-12, Radio Set AN/PRC-77 C1 thru 4, Jun 67
TEC Lesson 201-113-4501-F, Preparation of Radio Set AN/PRC-77 for Operation, Part I: Installation
TEC Lesson 201-113-4502-F, Preparation of Radio Set AN/PRC-77 for Operation, Part II: Operation Checks
TEC Lesson 201-113-4503-F, Preparation of Radio Set AN/PRC-77 for Operation, Part III: Pre-Sets

113-587-3005

PERFORM OPERATOR MAINTENANCE ON RADIO
SETS AN/PRC-77 OR AN/VRC-64

CONDITIONS:

You are participating in a field exercise or performing required garrison maintenance. Given either radio set (AN/PRC-77 or AN/VRC-64), prepared for operation, the appropriate TM, clean cloth, trichloroethylene, mild soapy water, flat tip screwdriver, a radio station within range, call signs, a frequency, a blank DA Form 2404, and TM 38-750.

STANDARDS:

1. Perform all prescribed operator maintenance steps as required by the appropriate TM.
2. Complete DA Form 2404 IAW TM 38-750, paragraph 3-4.

PERFORMANCE MEASURES:

1. Perform all prescribed operator maintenance steps for the AN/PRC-77 IAW TM 11-5820-667-12, chapter 4, pages 4-1 through 4-3, paragraphs 4-1 through 4-8.
2. Perform all prescribed operator maintenance steps for the AN/VRC-64 IAW TM 11-5820-498-12, chapter 4, pages 4-1 through 4-12, paragraphs 4-1 through 4-11.
3. Previously reported faults beyond the operator's capability to repair or those requiring parts are recorded on the Uncorrected Fault Record (DA Form 2408) in the logbook. This form is completed by organizational maintenance IAW procedures outlined in paragraph 4-13 of TM 38-750.
4. Faults which the operator cannot correct or which require a part are recorded on DA Form 2408 IAW procedures outlined in paragraph 3-4 of TM 38-750.

REFERENCES:

TM 38-750, Army Maintenance Management System (TAMMS), C2, May 78
TM 11-5820-498-12, Radio Sets AN/VRC-64 and AN/GRC-160, C5, May 67
(chap 4, pages 4-1 thru 4-12, para 4-1 thru 4-11)
TM 11-5820-667-12, Radio Set AN/PRC-77, C1 thru 4, Jun 67, (chap 4,
pages 4-1 thru 4-3, para 4-1 thru 4-8)
TEC Lesson 201-113-4501-F, Preparation of Radio Set AN/PRC-77 for
Operation, Part I: Installation

113-578-1002

TAKE A PHOTOGRAPH

CONDITIONS:

You will be given a KS-99C camera set, film, binoculars, and objects to photograph.

STANDARDS:

Take two photographs with camera, one using telephoto lens that are part of camera set and one using binoculars as telephoto lens.

Resulting pictures will be clear and readable.

PERFORMANCE MEASURES:

1. Using camera with its own telephoto lens:

- a. Check battery.
- b. Load camera.
- c. Set ASA/DIN setting.
- d. Select telephoto lens.
- e. Put lens on camera.
- f. Set shutter speed.
- g. Focus on object to photograph.
- h. Read the meter.
- i. Set f. stop.
- j. Take picture.
- k. Make entry in log.

2. Using camera with binoculars:

- a. Select and put normal lens on camera.
- b. Divide binoculars field by power magnification.
- c. Divide camera lens focal length by result of step 2b.
- d. Set f. stop for that setting. If between f. stops, set f. stop for next lowest f. stop (next higher number) than step 2c.
- e. Open up two full f. stops.
- f. Set camera focus on infinity.
- g. Set binoculars eyepiece at zero.
- h. Place eyepiece of binoculars flush on the camera lens.
- i. Read the meter and set shutter speed.
- j. Take picture.
- k. Make entry in log.

3. Rewind film and unload camera.

REFERENCES:

Subcourse SSO 501, Still Photography
TM 11-6720-253-10, Operator's Manual for Camera Set, Still Picture
KS-99C, Jun 75

2. Quarter-Wavelength Antenna. This antenna is ideal for a net control station (NCS) when operating with different teams and the exact team locations are not known. It can be used with any type of radio and is normally used when a groundwave is desired.

a. Length (in feet) of antenna is computed by dividing 234 by the operating frequency in megahertz.

b. A good ground system is essential (fig. 2).

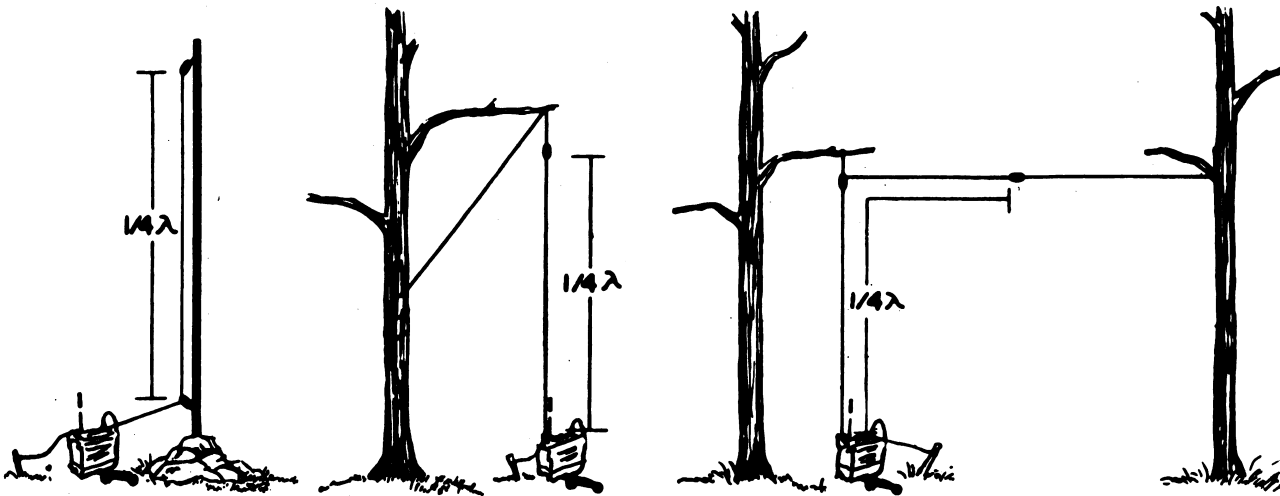


Figure 2. One-quarter-wavelength antenna (vertical).

3. Half-Wave Doublet Antenna. This antenna can be used with any type of radio and can be constructed in a horizontal or vertical plane (fig. 3).

a. It is constructed by using one-quarter-wavelength wire for each side.

b. Wire is fed in the center by coaxial cable or, as a field expedient, by twisted pair of field wires.

c. To connect this antenna to the radio set, one lead goes to the antenna binding post; the other goes to the ground binding post. No additional ground is necessary.

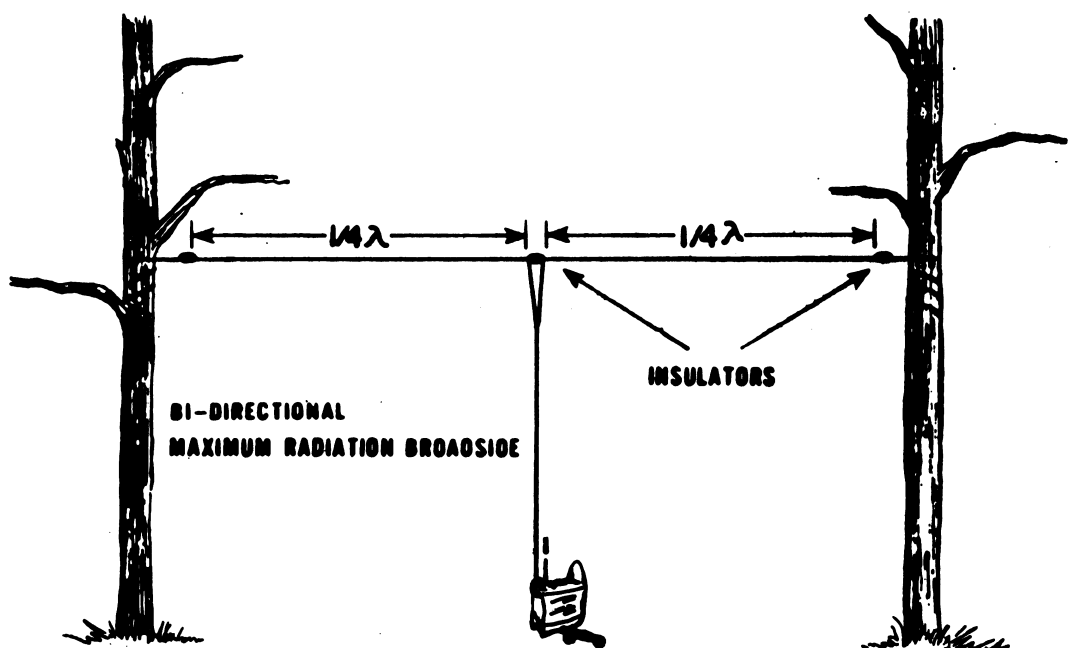


Figure 3. Half-wave doublet antenna.

4. Slant-Wire Antenna. This antenna is an efficient radiating system using a single antenna support (fig. 4).

a. Use two pieces of wire, each piece a quarter-wavelength long.

b. Slant one piece of wire from the antenna support at a 30° to 60° angle and connect it to the antenna post on the transmitter.

c. Use the other wire as a counterpoise. Lay it out just above the ground from the transmitter away from the slanting wire. (If insulated wire is not used, wire must be insulated from the ground.) Connect counterpoise to the radio ground post.

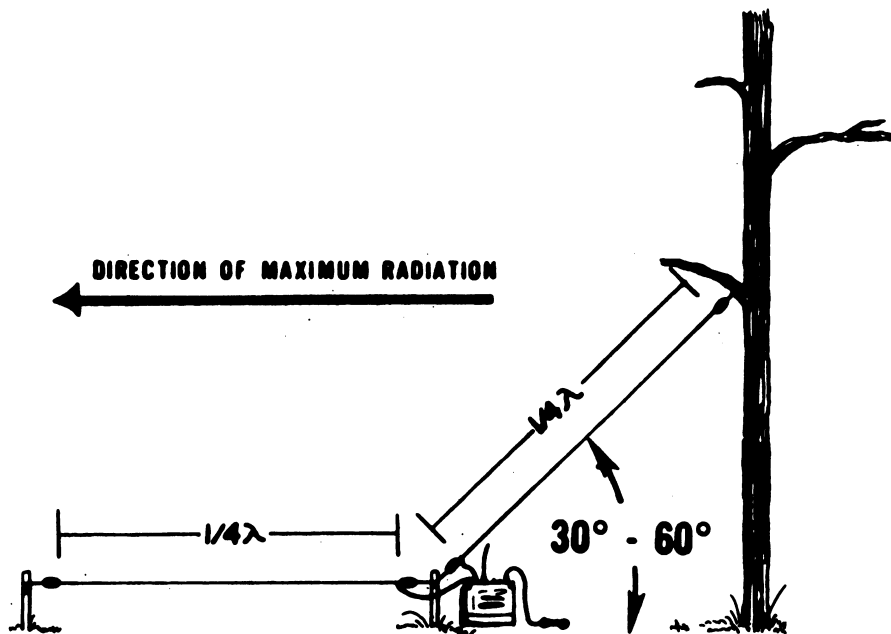


Figure 4. Slant-wire antenna.

5. Other Antennas. If you are operating outside the normal range of FM radio sets, an antenna system that will allow communication beyond the normal range of current radios can be constructed by using the jungle antenna (fig. 5) or the half-rhombic antenna (fig. 6).

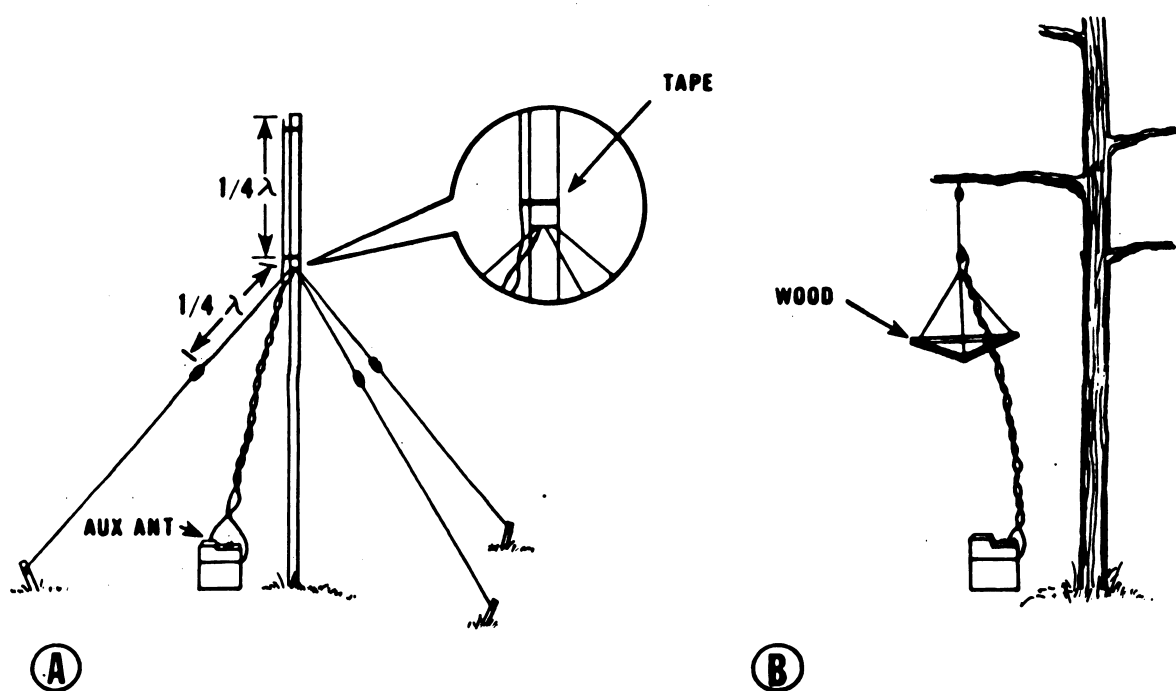


Figure 5. Jungle antenna.

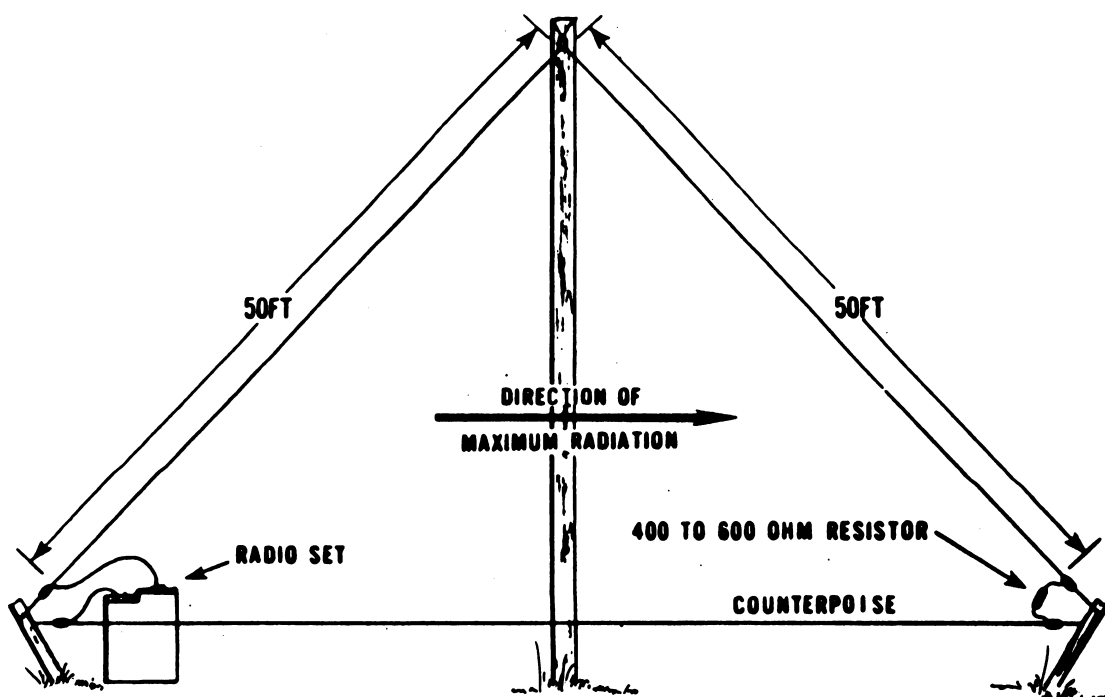


Figure 6. Half-rhombic antenna.

6. Connect antenna to radio and transmit message (see task 113-587-2001).

REFERENCES:

FM 24-1, Combat Communications, Sep 76, (app M, pages M-1 thru M-11)
FM 24-18, Field Radio Techniques, Jul 65, (chap 3, sec 4, para 67)

301-336-X501

SUBMIT AN INTELLIGENCE SPOT REPORT

CONDITIONS:

You will be given a means of communication, local SOP, and the requirement to report information about an opposing force, terrain, and/or weather.

This will be done during an FTX when opposing force activity is observed or indicated, or when the absence of opposing force activity is significant.

STANDARDS:

Report all available information concisely and expeditiously. Protect classified information as required by DOD 5200.1-R and AR 380-5.

PERFORMANCE MEASURES:

1. Collect the information to be included in the spot report. Use local spot report forms if available, or--

a. State your unit's identification.

b. Answer the questions: Who? What? Where? When? and How? (para 6-4, FM 30-5).

NOTE: A good reminder is the word "salute" (para 55, FM 21-75).

Size
Activity
Location
Unit
Time
Equipment

2. Report the information through channels as quickly as possible (para 55, FM 21-75).

3. If the report is classified, protect the information from compromise (para 6-4, FM 30-5).

FM 31-11C-S

REFERENCES:

DOD 5200.1-R, Department of Defense Information Security Program,
Nov 78

AR 380-5, Department of the Army Information Security Program,
Aug 79

FM 21-75, Combat Training of the Individual Soldier and Patrolling,
C4, Jul 67 (chap 4, page 54)

FM 30-5, Combat Intelligence, Oct 73

331-915-0619

PREPARE A FIELD SKETCH

CONDITIONS:

You will be given an area/object to sketch, a pencil, and paper.

STANDARDS:

1. Sketch an area/object so that it can readily be identified by others on the ground.
2. Sketch an area/object so that it can be identified on an aerial photograph or topographical map.

PERFORMANCE MEASURES:

1. Field sketches are normally prepared to depict manmade objects that have a bearing on the UW situation. Sketches will include but will not be limited to:
 - a. Information on the enemy--
 - (1) Positions (LPs, OPs, CPs, etc.).
 - (2) New/unusual equipment and markings.
 - (3) Uniform (patches, ranks, etc.).
 - b. Components of systems, such as--
 - (1) Weapons systems.
 - (2) Power systems.
 - (3) Water supply systems.
 - (4) Sewage systems.
 - c. Buildings and other structures.
 - d. Rivers, roads, footpaths, etc.

e. Terrain features (hills, gullies, forests, etc.).

2. Preparation.

a. Sketch must be drawn to "north" and include a "north-seeking arrow."

b. Except for rivers, roads, routes, etc., all writing on the sketch will be horizontal to north.

c. For ground-view identification:

(1) Areas. Indicate--

(a) Shape and approximate dimensions.

(b) Location of buildings/structures; enemy positions; terrain features (i.e., hills, rivers, forested areas, etc.); and roads, trails, etc., within the area.

(c) Color of buildings/structures if the color is an identifiable feature.

(2) Objects.

(a) Sketch from two different angles if possible.

(b) Indicate all identifiable features such as shape, size, color.

d. For aerial-view identification:

(1) Areas. Same as 2c(1), above.

(2) Objects. Indicate shape looking down on the object, color, location within an area, whether it can be easily moved.

e. The following information must be included or accompany each sketch:

PREPARED BY: (Name (code)/unit.)

OBJECT: (Area/item sketched.)

DTG: (Time sketch was started.)

COMPLETE DTG: (Time sketch was completed.)

LOCATION: (Of object.)

DIRECTION TO OBJECT: (General/specific azimuth.)

DISTANCE TO OBJECT: (How far away you were when sketching object/area.)

REASONS: (Why sketch was made.)

REMARKS: (Any additional information that has bearing on the value of the sketch or its use.)

REFERENCE:

None

FM 31-11C-S

331-915-0620

MARK LANDING ZONE FOR ROTARY-WING AIRCRAFT

CONDITIONS:

You will be given the necessary day or night marking devices, an area suitable for helicopter landings, and size of the landing zone required.

STANDARDS:

Within 30 minutes, properly mark a landing site for a helicopter. Use the guidelines provided below.

PERFORMANCE MEASURES:

1. Types of Markings.

a. Daylight marking devices will normally consist of panels or smoke.

b. Nighttime marking devices will normally consist of fire pots, flashlights, or other light sources that are clearly visible to the pilot(s) of the helicopter(s).

2. Wind Direction. The reception committee leader (RCL), upon arriving at the landing zone, will determine the wind direction by use of his compass. Once wind direction is determined, he will insure the stem of the "Y" points into the general heading of the wind direction. The pilot will land into the wind between lights "D" and "E" and not forward of light "C." (See fig. 1.)

3. Dimensions of Landing Zone. Refer to task Select Landing Site for Rotary-Wing Aircraft. This task provides the information on size of landing sites/zones.

4. Marking.

a. Visual markings for helicopter landing zones provide the wind directions, identification, direction of approach, and the designated touchdown area. Visible light sources are used at night and panels in daylight as prescribed by/in the CEOI.

b. In order not to disclose the landing to the enemy, markings should be kept to a minimum and displayed only when required. The markings should be firmly secured or removed before the helicopter hovers so they will not blow up into the rotors' engine intakes.

c. Landing zone markers should be adjusted to the existing winds. When surface winds are a factor (10 knots or more for infiltrations under load and 15 knots or more for exfiltrations under load), the markers will be positioned to insure landing is made into the wind, regardless of the approach track established in the mission request and confirmation message. The helicopter will make its initial approach to the landing zone along the designated track and, if necessary, will adjust to the final approach track indicated by the landing zone markings. The following illustration shows the helicopter landing zone "Y" marking pattern used for night operations.

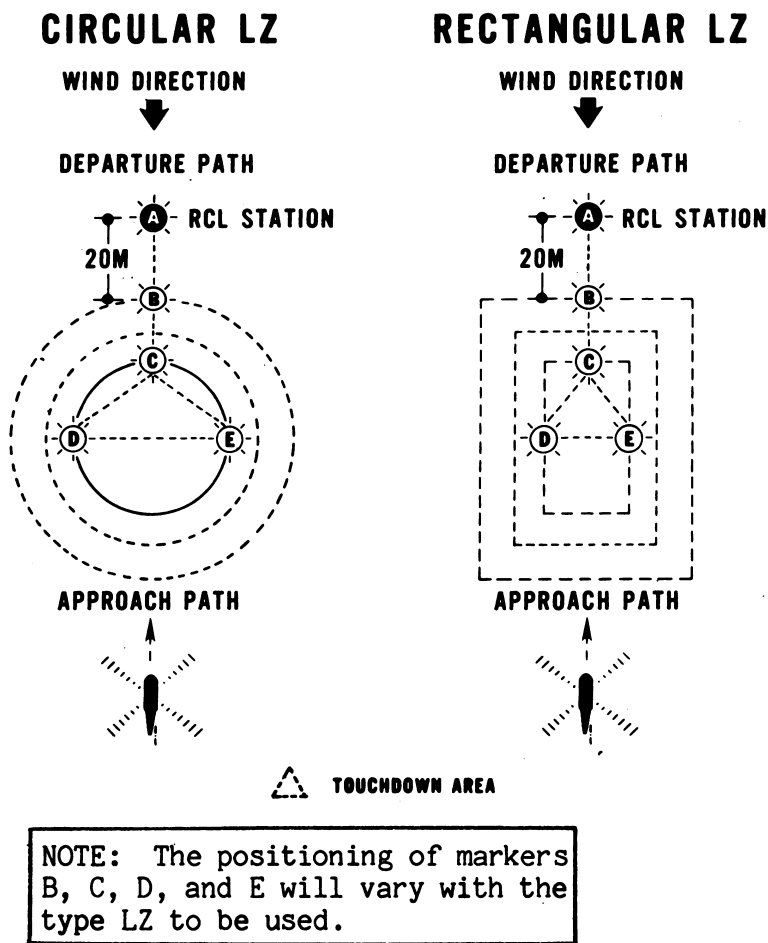


Figure 1

5. Obstacles. Obstacles must be marked for daylight and night helicopter operations.

a. During daylight helicopter operations, obstacles that may be difficult to detect and impossible to remove such as wires, holes, stumps, and rocks should be marked with red panels or any other easily identifiable means.

b. During night helicopter operations, red lights will normally be used to mark all obstacles within a landing zone that cannot be easily eliminated. In most combat situations, it is impractical for security reasons to use red lights to mark the tops of these on the approach and departure ends of a landing zone. In a training situation, however, or in rear area landing zones, red lights should be used whenever possible. In the event that obstacles cannot be marked, aviators should be thoroughly advised of existing obstacles by ground-to-air radio.

6. Display and Authentication.

a. Landing zone markings will be displayed for 4 minutes, beginning 2 minutes before and remaining 2 minutes past the scheduled arrival time or until offloading/onloading is completed and the helicopter departs.

b. Authentication procedures/code signals will be prescribed in the CEOI; however--

(1) Arrival at the landing zone within the specified time block on or near the designated approach track will serve to authenticate the mission aircraft.

(2) At night, the RCL displays the proper authentication code signal by flashing a green light or other designated signal aimed towards the approach track of the oncoming aircraft. When the helicopter is on its final approach, the RCL then displays a continuous green light aimed at the underside of the fuselage to assist pilot ground orientation.

(3) In daylight, a distinctive panel or smoke signal is displayed. When smoke is used, the landing zone must be planned to preclude the prevailing wind from causing the smoke to obscure the landing zone.

REFERENCE:

(C) TC 31-20-3, Special Forces Air and Maritime Operations, Jun 78 (chap 2, pages 68-72)

FM 31-11C-S

331-915-0621

SELECT LANDING SITE FOR ROTARY-WING AIRCRAFT

CONDITIONS:

You will be given the mission/requirement, time, and size of landing site required. Select a landing site for one helicopter. This will be done in a field environment under acceptable weather conditions.

STANDARDS:

Select an appropriate landing site using the guidelines/criteria below.

PERFORMANCE MEASURES:

1. Criteria for Landing Sites. The size of the landing site will depend on the number of landing points within it and the size of these landing points. The criteria as provided in figures 1 through 6 represent the minimum dimensions of each landing point. The helicopter units will designate size 1, 2, 3, or 4 circular landing points or size 3 or 4 rectangular landing points to be used by their units for specific operations. Numerous considerations such as helicopter type, unit proficiency, nature of loads, climate conditions, and day or night operations may apply to size of landing point used. Recommended distances between landing points within a landing site are as follows:

- a. Size 1 80 ft (25 meters)
- b. Size 2 115 ft (35 meters)
- c. Size 3 165 ft (50 meters)
- d. Size 4 330 ft (100 meters)

NOTE: Measured from center to center.
--

2. Approaches. Ideally, there should be obstruction-free approach and exit paths into the prevailing wind; in conditions of light wind by day, a single approach/exit is acceptable. The normal maximum obstruction angle, measured from the outer edge

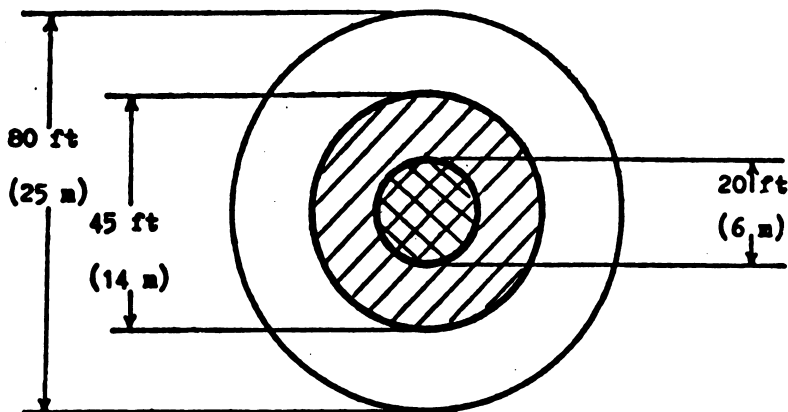
of the area cleared to ground level, should be 60° or 1 in 10 (see fig. 7). However, greater obstruction angles may be acceptable, but this must be confirmed by the helicopter unit.

3. Surfaces. The surface of the center of the landing point must be even and sufficiently firm to allow a fully loaded ground vehicle (e.g., one-fourth ton for light helicopters; 3 tons for larger helicopters) to stop and start without sinking. The whole landing point must be cleared of any loose material or piles of dust/sand which could be blown up by the rotors of the helicopter. Landing points with sandy or dusty surfaces should be stabilized or covered by an agreed method. Any snow on any landing point should be packed or removed to reveal any hazardous objects and reduce the proportion of blowing snow; a marker is essential to provide a visual reference for depth perception and also to reduce the effect of whiteout.

4. Slope of Ground. The ground should be relatively level, and the slope should not exceed 7° (1 in 8) if the helicopter is to land. However, at the pilot's discretion, it may be possible for a helicopter to hover just in contact with the ground on slopes of greater than 7° (1 in 8).

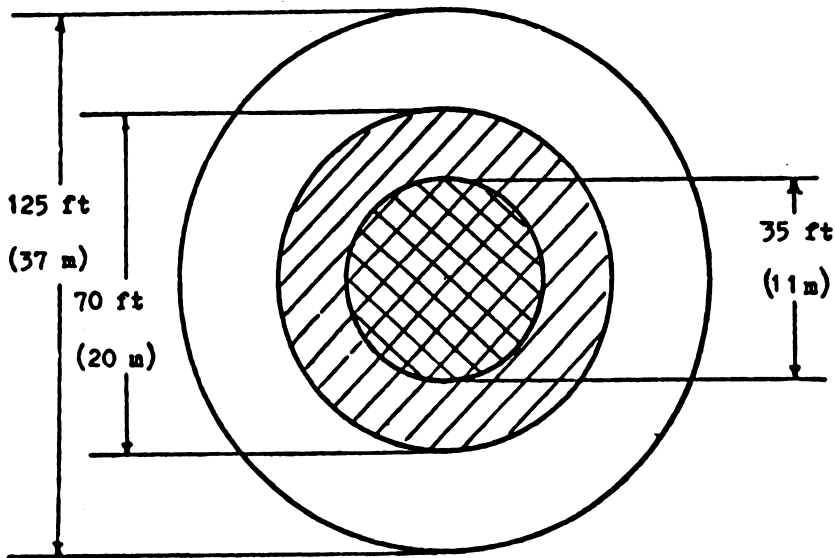
5. Concealment. A landing site close to forward troops should be below the line of sight of enemy ground observation with, when possible, an approach/exit route giving similar cover.

HELICOPTER LANDING POINTS



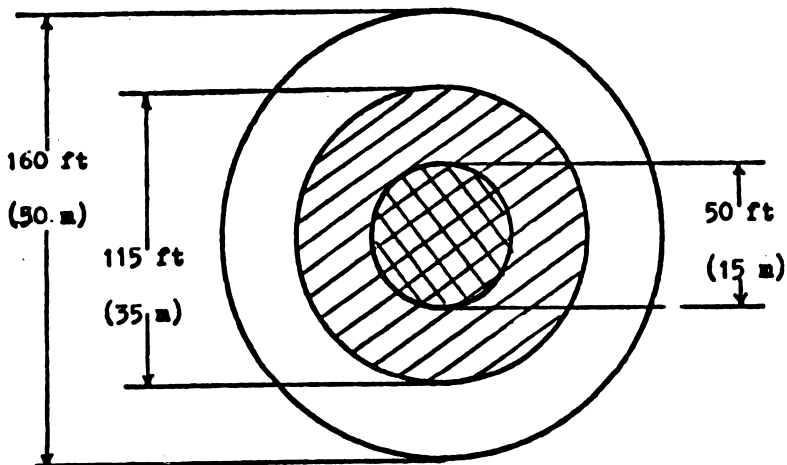
SEE LEGEND
(page 2-328)

Figure 1. Size 1 landing point.



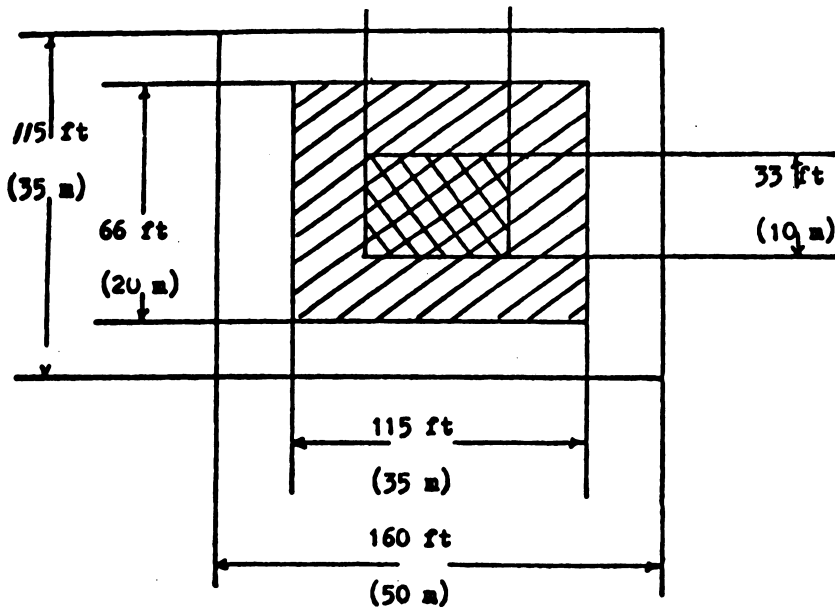
SEE LEGEND
(page 2-328)

Figure 2. Size 2 landing point.



SEE LEGEND
(page 2-328)

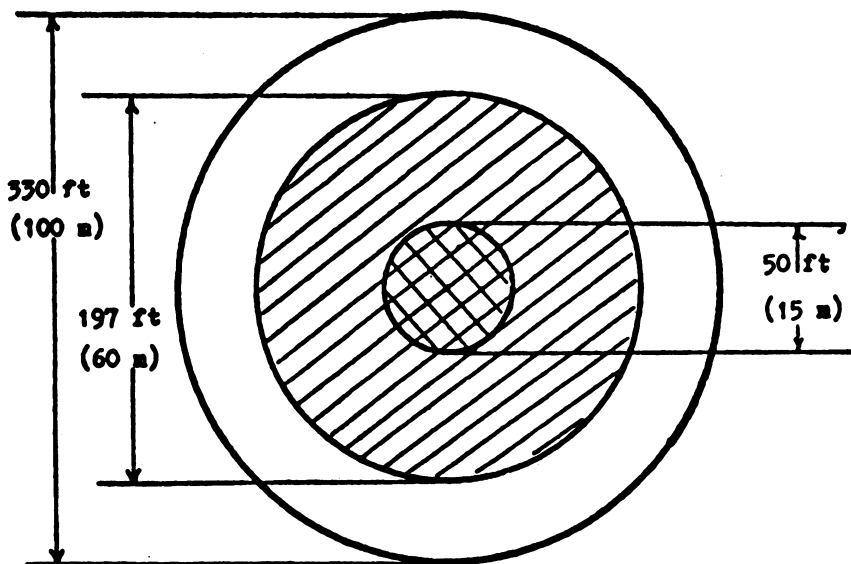
Figure 3. Size 3 landing point, circular.



SEE LEGEND
(page 2-328)

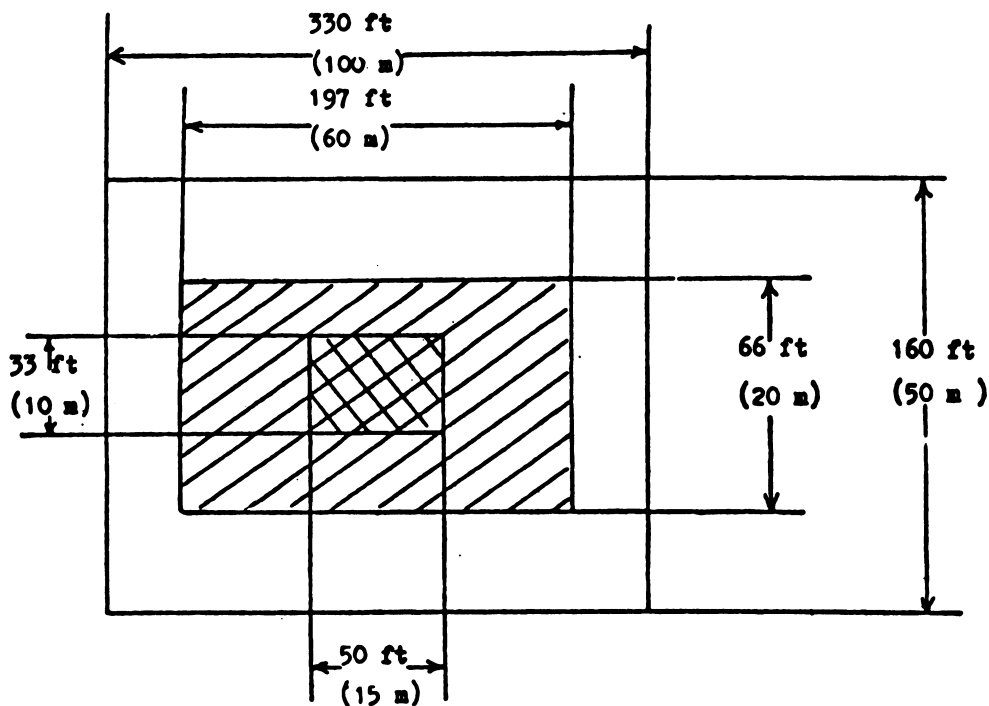
NOTE: Approach/exit will be made on the longitudinal axis of the clearing.

Figure 4. Size 3 landing point, rectangular.



SEE LEGEND
(page 2-328)

Figure 5. Size 4 landing point, circular.



SEE LEGEND
(page 2-328)

NOTE: Approach/exit will be made on the longitudinal axis of the clearing.

Figure 6. Size 4 landing point, rectangular.

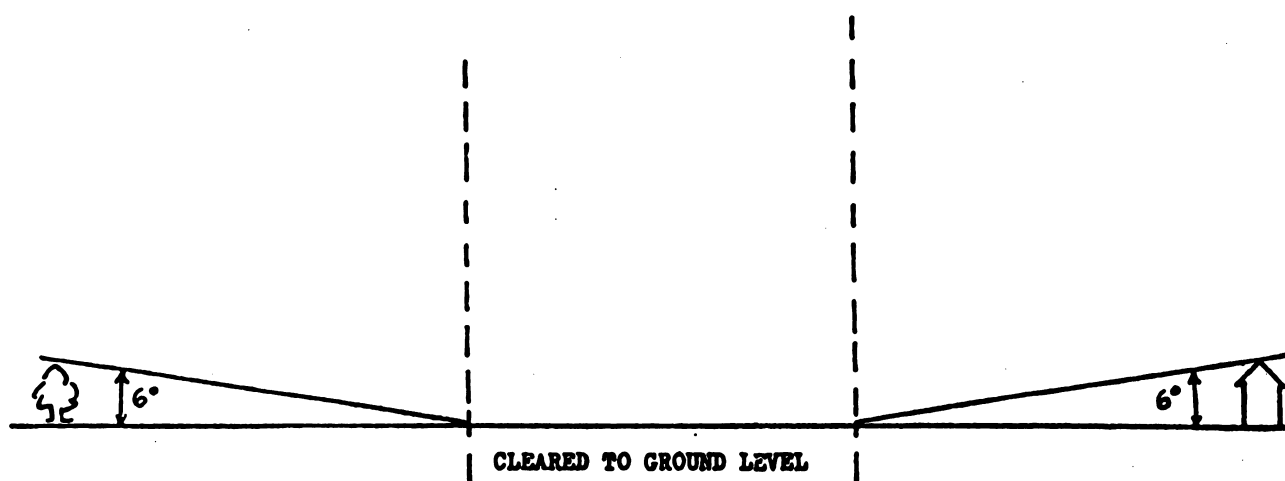


Figure 7. Landing point obstruction angle.

LEGEND

CLEARED TO
GROUND LEVEL



FREE OF OBSTRUCTION
OVER 2 FT (0.6M) HIGH



HARD SURFACE



REFERENCE:

(C) TC 31-20-3, Special Forces Air and Maritime Operations, Jun 78
(chap 2, pages 68-72)

331-915-0622

STERILIZE DROP ZONES AND LANDING ZONES

CONDITIONS:

You will be given personnel to cover the mission (one individual per parachutist, two per door bundle), necessary tools and equipment, and materials found in the area.

STANDARDS:

Return drop zone or landing zone to the condition it was in prior to the operation.

PERFORMANCE MEASURES:

1. Police or obliterate cigarette butts, candy and gum wrappers, equipment, and other signs of occupancy such as crushed undergrowth, heel scuffs, trails, and human waste.
2. Recover all rigging straps and other air delivery equipment.
3. Assign an individual at the recovery collection point to be responsible for accounting for air items and packages as recovery teams bring them off the DZ/LZ.
4. Provide a two- or three-man surveillance team to maintain a close watch on the DZ/LZ area for enemy activity during the 48 hours following the drop.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (chap 6)

331-915-0623

PREPARE A SELECTED PORTION OF AN AREA ASSESSMENT

CONDITIONS:

You will be given area study, operational area intelligence, maps, and photographs of the area.

STANDARDS:

Indicate the changes to be made in the operational area intelligence in your area of responsibility for your duty position.

PERFORMANCE MEASURES:

1. An area assessment is the immediate and continuing collection of information started after infiltration into an unconventional warfare operational area (UWOA). It--

a. Confirms or refutes previous intelligence acquired as a result of area studies and other sources prior to infiltration.

b. Is a continuing process.

c. Forms the basis for modifying and replanning operational and logistical support for the operational area.

d. Includes reevaluation of information of the enemy, weather, and terrain.

e. Includes reanalysis of the information concerning differently motivated segments of the civilian populace supporting operations.

2. The major categories and subcategories in the principal area assessment are--

a. Enemy.

(1) Disposition.

- (2) Composition, identification, and strength.
- (3) Organization, armament, and equipment.
- (4) Degree of training, morale, and combat effectiveness.
- (5) Operations:
 - (a) Recent and current activities of the unit.
 - (b) Counterguerrilla activities and capabilities with particular attention to reconnaissance units, special troops (airborne, mountain, ranger), rotary-wing and vertical-lift aviation units, counterintelligence units, and units having a mass CBR delivery capability.
- (6) Unit areas of responsibility.
- (7) Daily routine of the units.
- (8) Logistical support to include--
 - (a) Installations and facilities.
 - (b) Supply routes.
 - (c) Methods of troop movement.
- (9) Past and current reprisal actions.

b. Security and Police Units.

- (1) Dependability and reliability to the existing regime or the occupying power.
- (2) Disposition.
- (3) Composition, identification, and strength.
- (4) Organization, armament, and equipment.
- (5) Degree of training, morale, and efficiency.
- (6) Utilization and effectiveness of informers.
- (7) Influence on and relations with the local populace.

(8) Security measures over public utilities and government installations.

c. Civil Government.

(1) Control and restriction, such as:

(a) Documentation.

(b) Rationing.

(c) Travel and movement restrictions.

(d) Blackouts and curfews.

(2) Current value of money and wage scales.

(3) The extent and effect of the black market.

(4) Political restrictions.

(5) Religious restrictions.

(6) Control and operation of industry, utilities, agriculture, and transportation.

d. Civilian Populace.

(1) Attitudes toward the existing regime or occupying power.

(2) Attitudes toward the resistance movement.

(3) Reaction to US support of the resistance.

(4) Reaction to enemy activities in the UWOA.

(5) General health and well-being.

e. Potential Targets.

(1) Railroads.

(2) Telecommunications.

(3) POL.

(4) Electric power.

(5) Military storage and supply.

- (6) Military headquarters and installations.
- (7) Radar and electronic devices.
- (8) Highways.
- (9) Inland waterways and canals.
- (10) Seaports.
- (11) Natural and synthetic gaslines.
- (12) Industrial plants.
- (13) Key personalities.

f. Weather.

- (1) Precipitation, cloud cover, temperature, visibility, and seasonal changes.
- (2) Wind speed and direction.
- (3) Light data (beginning morning nautical twilight, end of evening nautical twilight, sunrise, sunset, moonrise, moonset).

g. Terrain.

- (1) Location of areas suitable for guerrilla basepoints and other installations.
- (2) Potential LZs/DZs and other reception sites.
- (3) Routes suitable for:
 - (a) Guerrillas.
 - (b) Enemy forces.
- (4) Barriers to movement.
- (5) Seasonal effect of the weather on terrain and visibility.

h. Resistance Movement.

- (1) Guerrillas.
 - (a) Disposition, strength, and composition.

- (b) Organization, armament, and equipment.
- (c) Status of training, morale, and combat effectiveness.
- (d) Operations to date.
- (e) Cooperation and coordination between and among various existing groups.
- (f) General attitude toward the United States, the enemy, and various elements of the civilian populace.
- (g) Motivation of the various groups and their receptivity.
- (h) Caliber of the senior and subordinate leadership.
- (i) Health.
- (2) Auxiliaries and the underground.
 - (a) Disposition, strength, and degree of organization.
 - (b) General effectiveness and type of support.
 - (c) Motivation and reliability.
 - (d) Responsiveness to guerrilla or resistance leaders.
 - (e) General attitude toward the United States, the enemy, and to various guerrillas.

i. Logistic Capability.

- (1) Availability of food stocks and water, to include any restriction for reasons of health.
- (2) Agricultural capability.
- (3) Type and availability of transportation of all categories.
- (4) Types and location of civilian services available for manufacture and repair of equipment and clothing.
- (5) Type and amount of supplies locally available.

(6) Medical facilities to include personnel, medical supplies, and equipment.

(7) Enemy supply sources accessible to the resistance.

j. Preventive Medicine.

(1) Weather.

(a) Is the weather cold enough to put emphasis on causes, treatment, and prevention of cold weather injuries?

(b) Is the weather hot enough to put emphasis on causes, treatment, and prevention of hot weather injuries?

(2) Terrain: How does the terrain affect evacuation and medical resupply?

(3) Indigenous personnel.

(a) Physical characteristics: Describe endurance, ability to carry loads, and to perform other physical feats.

(b) Dress: What symbolism is attached to various articles of clothing and jewelry, such as amulets?

(c) Attitudes:

1. What taboos and other psychological attributes are present in the society?

2. Describe rites and practices by witch doctors during illness. What do these rites symbolize?

3. How do indigenous personnel respond to events such as fear, happiness, anger, and sadness?

(4) Housing:

(a) Analyze physical layout of the community.

(b) Determine infestation with ectoparasites and vermin.

(5) Food:

(a) Is food cultivated for consumption? What foods?

(b) How do the seasons of the operational area influence diet? Does migration in search of food occur?

(c) What foods provided by US personnel do the indigenous personnel prefer?

(d) What cash crops are raised?

(6) Water supply, urban: What kind of water treatment plants are used (if any)?

(7) Water supply, rural:

(a) What types of rural water supplies are available? Where are they located?

(b) What treatment is given to water in rural areas? Give attitudes of the indigenous personnel toward standard US purification methods.

(8) Sewage disposal (when applicable):

(a) What are the types and locations of sewage treatment plants?

(b) In remote areas, what system is used for disposal of human excrement, offal, and dead animals and humans?

(c) What are the attitudes of the indigenous personnel to standard US methods, such as the use of latrines?

(9) Epidemiology: What specific diseases in each of the following major categories are present among the guerrillas, their dependents, or their animals?

(10) Domestic animals:

(a) What domestic animals are present?

(b) Describe the normal forage.

1. Do owners supplement the food supply? What food supplements are given, if any?

2. Are animals penned or allowed to roam?

(c) Is any religious symbolism or taboo associated with animals ("sacred cows")? Are animals sacrificed for religious purposes?

(d) Are local veterinarians available for animal treatment and ante and post mortem inspections of meats?

(11) Local fauna: Record species of birds, large and small mammals, reptiles, and anthropoids present in the area; if names are unknown, describe (survival purposes).

(12) Poisonous plants: Record those species which are known to be toxic to man through contact with the skin, inhalation of smoke from burning vegetation, or through ingestion (survival).

3. Major changes in the area study indicated by area assessments will be furnished to the SFOB during the course of normal communications. These changes provide the latest intelligence information to the area specialist teams (ASTs).

4. The results of the area assessment should be transmitted to the SFOB only when there is a deviation from previous intelligence and the information would have an impact on plans of higher headquarters.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (para 2-6 and app B)

331-915-0624

DETERMINE THE GUERRILLA TRAINING REQUIREMENTS

CONDITIONS:

You will be given detachment's mission, area study, intelligence reports, estimate of the training situation, map of the area, pencil, and paper.

STANDARDS:

Determine the training required in your area of responsibility. Select the best training system to be used.

PERFORMANCE MEASURES:

You must consider--

a. Personnel making up the resistance force:

- (1) Wide range of education and capability levels.
- (2) Different reasons for joining the resistance force.
- (3) Differences in extent of military experience.
- (4) Language barriers requiring use of interpreters.
- (5) Resistance leaders. Do they need training in the technical and tactical aspects of conducting guerrilla warfare?

b. The training situation:

- (1) Essential training to be conducted. Establish priorities for subject material.
- (2) Training time available.
- (3) Training material available.
- (4) Improvised training aids and mockups for use during the early phase.

(5) Location of range and rehearsal areas. Physical security to preclude enemy detection must be considered.

(6) Use of combat engagements as a training means.

c. The training system:

(1) Centralized training.

(2) Decentralized training.

(3) Individual or on-the-job training.

(4) Specialized training for selected personnel.

In most instances one or all of the systems noted above will be used. To expedite training programs and to provide effective instruction to dispersed units, a centralized training course may be designed and presented to selected resistance personnel who, in turn, act as instructor cadres to dispersed units. When this occurs, a decentralized system is put into effect.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (para 5-16 and 5-17)

331-915-0625

PREPARE A LESSON PLAN

CONDITIONS:

You will be given a specific class to present, an assistant instructor, paper, pencil, list of available training aids, list of available equipment, personal data and number of students to participate, and location and time of class.

STANDARDS:

IAW the training outlined below, prepare a lesson plan that adequately covers the subject assigned. As a minimum, cover the training objective, intermediate training objectives, administrative instructions, training sequence, and time estimate and safety restrictions, if any.

PERFORMANCE MEASURES:

1. The lesson plan is the trainer's game plan. It is developed during the preparation phase of training. Lesson plans are not designed to record every word of a trainer's presentation. Rather, the lesson plan provides a practical and economical aid to preparing training. The lesson plan, properly constructed, also provides a means to record the specific training conducted and to assist future trainers in preparing training. Lesson plans can be supplemented by informal trainer notes to assist the trainer in preparing the Phase I (explanation and demonstration) portion of a training session. Trainer notes may include important opening and closing statements, prompts or other reminders, and key statements pertaining to safety. They are particularly helpful when conducting a rehearsal. Because trainer notes are designed to meet each individual trainer's specific needs, no particular format is recommended.

2. The following minimum information is recommended for inclusion in the lesson plans:

- a. The commander's training objective(s).
- b. All intermediate training objectives (if any) listed in the sequence to be taught.

- c. Administrative instructions:
 - (1) When the training will be conducted.
 - (2) Training location.
 - (3) Who will be trained.
 - (4) Principal and assistant trainers.
 - (5) Training aids, devices, and equipment to be used.
 - (6) References.
 - d. Training sequence and time estimate.
 - e. Safety restrictions.
 - f. Additional information required by local SOPs.
3. An example of a lesson plan is at Inclosure 1.

REFERENCE:

FM 21-6, How to Prepare and Conduct Military Training, Nov 75 (app G, page 156)

INCLOSURE 1: EXAMPLE LESSON PLAN FOR CONDUCT OF STUDENT TRAINING SESSION

A. TRAINING OBJECTIVE:

TASK: Each soldier will conduct immediate action for an M72A2 light antitank weapon (LAW).

CONDITIONS: Given an expended M72A2 launcher, the direction of the target, and the following instructions: "Your LAW has just misfired. Take the appropriate action."

TRAINING STANDARD: Soldier performs the following in sequence without error or omission:

1. Keeping launcher trained on target, soldier waits 10 seconds*, then places the safety on "SAFE" and removes launcher from his shoulder.
2. Soldier waits 1 minute*, then collapses launcher approximately 4 inches, reextends the launcher, and attempts to fire.
3. If launcher does not fire (trailer indicates), soldier waits 10 seconds* and returns safety to "SAFE." Keeping launcher trained on target, he waits at least 1 minute and if LAW has not fired, he discards LAW IAW unit SOP.

*Times are approximate.

B. INTERMEDIATE TRAINING OBJECTIVES: None.

C. ADMINISTRATIVE INSTRUCTIONS (to be completed by unit):

1. When training will be given.
2. Training location.
3. Who will be trained.
4. Principal and assistant trainers.
5. Training aids and equipment: One expended M72A2 launcher per soldier.
6. Reference: FM 23-33, Jul 70, page 11.

D. SEQUENCE (of) ACTIVITY (and) ESTIMATED TIME:

1. State training objective and reason for learning the task. 1 min
2. Demonstrate the immediate action drill, emphasizing key points. 3 min
3. Conduct walk-through, insuring each student performs each step fully. 3 min
4. Conduct practice until all students are ready to be tested. 3 min
5. Test students individually. Students not being tested may observe test in progress. 3 min
6. Retrain and retest students who are NO GO. 2 min

TOTAL 15 min

E. SAFETY RESTRICTIONS: None.

F. ADDITIONAL COMMENTS AND INFORMATION: None.

331-915-0626

USE CATALOG SUPPLY SYSTEM TO REQUEST ITEMS

CONDITIONS:

You will be given a sample extract of a catalog supply system (CSS), a supply request, pencil and paper, and message format.

STANDARDS:

Accurately translate the request for supplies into message format.

PERFORMANCE MEASURES:

1. A catalog supply system (CSS):

a. Is a brevity code system established to support SF detachments when requesting delivery of supplies into an operational area.

b. Should be developed for units based on mission requirements, contingency plans, and unit field SOPs.

c. Is printed in the language of the indigenous UW force as well as in English.

d. Identifies a single major item or several associated items by a code word. Items not listed should be requested by nomenclature in sufficient detail to insure understanding at the SFOB.

2. The CSS is not secure by itself, but it serves to reduce message length and transmission time when a variety of supplies are requested. Examples of a CSS used here are for illustrative purposes and brevity and do not provide any degree of security. The CEOI will prescribe those code designations for actual operational missions.

a. Each broad classification of supply is listed in sequence by an assigned code letter designation:

SECTION	DESIGNATION
Chemical	ALPHA ALPHA through DELTA ZULU
Demolitions and Mines	ECHO ALPHA through HOTEL ZULU
Medical	INDIA ALPHA through LIMA ZULU
Weapons and Ammunition	MIKE ALPHA through PAPA ZULU
Quartermaster	QUEBEC ALPHA through TANGO ZULU
Signal	UNIFORM ALPHA through WHISKEY ZULU
Special	X-RAY ALPHA through ZULU ZULU

b. Some units and packages are followed by a numbered list showing the contents of the package or unit. The unit or package can be ordered complete, or any numbered item may be ordered separately. For example:

- (1) Six radio sets AN/PRC-77 are required.
- (2) Under Signal appears the code designation UNIFORM HOTEL.
- (3) Item 1 under Unit Data Contents reads "Two AN/PRC-77 complete."
- (4) Your request would read THREE UNIFORM HOTEL ONE indicating six radios are required.

EXAMPLE CATALOG SUPPLY SYSTEM

CHEMICAL

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
ALPHA ALPHA	Chemical Grenade No. 1 (16 rds).	46 lbs	1	Sixteen grenades, hand, smoke WP, M15, packed in individual containers.
ALPHA INDIA	Water testing Kits (24)	50 lbs	1	Twenty-four water testing kits chemical agents, AN-M2.
ALPHA OSCAR	Napalm	42 lbs	1	Eight cans chemical agent thickener, five ¼ lb cans.

DEMOLITIONS AND MINES

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
ECHO ALPHA	Demolitions No. 1 (20 blocks).	50 lbs.	1	20 blocks, demolition, M5A1 (2 ½-lb comp C-4).
FOXTROT FOXTROT	Electric Demolition Unit No. 2.	740 lbs	14	1. One electric demolition unit No. 1. 2. 250 caps, blasting, special, electric, Type II, J2, PETN, packed 50 per box. 3. One detonating cord unit. 4. Twelve demolitions units No. 1.
GOLF ECHO	Anti-Personnel Mines, No. 3.	45 lbs	1	15 weapons, AP, M18, Claymore.

MEDICAL

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
INDIA JULIET	Narcotics Unit	20 lbs	1	1. 120 boxes morphine sulfate, 15-mg syrette, 5 per box. 2. Six boxes of nalorphine hydrochloride injection, six per box. 3. 24 bottles of codeine phosphate, 30-mg tablet, 10 per bottle. 4. Six bottles of meperidine hydrochloride, small.
JULIET OSCAR	Typhoid Immunization	18 lbs	1	50 vials of typhoid—paratyphoid vaccine, 50-cc vial.
JULIET XRAY	Gamma Globulin	10 lbs	1	Ten bottles of globulin, immune serum, 10-cc bottle.

WEAPONS AND AMMUNITION

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
MIKE HOTEL	Sniper Rifle (6)	165 lbs	3	1. Two rifles, cal .30, M1C, complete (23 lbs). 2. 480 rds, cartridge, AP, cal .30, 8-rd clips in bandoleers, packed in ammunition can, M-8 (2 cans, 32 lbs).
NOVEMBER CHARLIE	Rifle Ammunition No. 1 (2880 rds).	192 lbs	3	960 rds, cartridge, AP, cal .30, 20-rd cartons, packed in ammunition can, M8 (4 cans, 64 lbs).
NOVEMBER PAPA	Grenade No. 1 (50 rds)	60 lbs	1	50 grenades, hand, fragmentation, M26 (T38E1), packed in individual containers (60 lbs).

QUARTERMASTER

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
QUEBEC BRAVC	Clothing Equipment—100 personnel.	2100 lbs	50	Consists of 50 two-man units.
ROMEO BRAVO	Rations, Indigenous Personnel—500 men.	8500 lbs	170	High fat content meat or canned fish, poultry, sugar, tobacco, salt, coffee, or tea, grain, flour or rice, accessory items, and water purification tablets (50 lbs).
ROMEO ECHO	Packet, barter	500 lbs	10	50-lb packages.

SIGNAL

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
UNIFORM ECHO	Flashlights (20)	45 lbs	1	1. 20 flashlights (15 lbs). 2. 120 batteries, BA 30 (30 lbs).
UNIFORM HOTEL	Radio Set AN/PRC-77(2)	99 lbs	1	1. Two AN/PRC-77 complete (47 lbs). 2. 12 batteries, BA-4386 (52 lbs).
UNIFORM OSCAR	Telephones Sound Powered	45 lbs	1	1. 3 Reel Equipment, CE-11 (15 lbs). 2. 3 Spools, DR-8, with 3/8 mi WD-1/TT (30 lbs).

SPECIAL

Code	Unit designation	Unit wt	No. pkgs.	Unit data contents
XRAY ALPHA	River Crossing Unit No. 1	50 lbs	1	1. Five life rafts, inflatable, one-person capacity, with CO ₂ cylinder and accessory kit. 2. Five life preservers, yoke with gas cylinder. 3. Five paddles, boat, 5 feet long.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (para 8-16)

331-915-0627

DETERMINE UWOA LOGISTICAL SUPPORT REQUIREMENTS

CONDITIONS:

You will be given detachment's mission, area study, intelligence reports, approximate size of the guerrilla force, map of the area, pencil, and paper.

STANDARDS:

Determine the logistical support requirements in your area of responsibility.

PERFORMANCE MEASURES:

You must consider--

a. Internal support:

- (1) Food, clothing, and shelter that are available.
- (2) Locally available transportation.
- (3) Care of the sick and wounded and other personal services.
- (4) Arms and military equipment available as a result of successful guerrilla operations.
- (5) Support available from auxiliary units within a guerrilla unit's assigned sector.

b. External support:

- (1) Weapons, ammunition, demolitions, medical supplies, and communication equipment.
- (2) Rations and clothing.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (chap 8)

331-915-0628

PLAN FOR RESUPPLY OPERATIONS

CONDITIONS:

You will be given detachment's mission, map of the UWOA, area study, protractor, pencil, and paper.

STANDARDS:

Based on the detachment's mission, determine automatic and emergency resupply requirements.

Determine location of delivery sites.

PERFORMANCE MEASURES:

1. Automatic Resupply Operations.

a. Automatic resupply is planned to replace lost or damaged items of equipment and to augment the detachment with equipment which could not be carried in an infiltration.

b. The team packs the automatic resupply with the items it deems necessary.

c. Automatic resupply is scheduled for delivery shortly after the detachment has been committed. It is prearranged as to time, delivery site, and composition of load.

d. This resupply is delivered automatically unless the detachment cancels or modifies the original plan.

2. Emergency Resupply Operations.

a. Prior to infiltration:

(1) Emergency resupply procedure and delivery site are determined and coordinated through the SFOB with the supporting air arm based on all available intelligence of the area.

(2) The contents of the emergency resupply bundle(s) normally will be communication, survival, and medical equipment to--

(a) Restore the detachment's operational capability.

(b) Provide the detachment with sustenance and medical supplies in the event of injuries and loss of equipment during infiltration.

b. The emergency resupply is flown when the operational detachment has not established contact with the SFOB within a designated period of time after infiltration. Infiltration is considered complete when the initial entry report is made by the detachment.

c. After infiltration:

(1) After the initial entry report is submitted and the operational detachment is established in the operational area, emergency resupply delivery sites are selected and reported to the SFOD.

(a) Emergency resupply is prearranged as to time and composition of load.

(b) The guerrillas should not be told the location of the emergency resupply delivery sites and the contents of the load.

(2) The contents of the load will consist of those items needed to restore the operational capability of the detachment, such as--

(a) Radio equipment as well as electronic homing devices that may assist in establishing exfiltration sites when radio silence is mandatory.

(b) Survival and medical equipment.

(c) Weapons and ammunition so the detachment can--

1. Defend itself pending exfiltration.

2. Provide local resistance forces (if contact is still maintained) with means to continue limited operations.

d. Emergency resupply is started when--

(1) Radio contact has not been established between the deployed Special Forces element and the SFOB/FOB within a set period of time after infiltration.

(2) A predetermined, consecutive number of scheduled radio contacts between the deployed Special Forces element and the SFOB/FOB have not been made.

e. If the SFOD must be moving all the time, emergency delivery sites should be selected and reported. If a set number of radio contacts are missed, resupply is made to the last reported delivery site.

f. In receiving the emergency resupply, the SFOD will follow the procedures used for an unmarked delivery site.

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (chap 8)

331-915-0629

TAKE A SET OF FINGERPRINTS

CONDITIONS:

You will be given an individual to fingerprint, a substance to take the fingerprints, a fingerprint record card, and a magnifier.

STANDARDS:

Fingerprints will be clear enough to be classified.

PERFORMANCE MEASURES:

1. The equipment needed for taking and interpreting fingerprint impressions is simple and inexpensive. It consists of a substance, a smooth surface, a magnifier, and a fine line. Standard items of equipment may not be available, and you may have to improvise from locally available material.

a. The substance used to obtain fingerprint impressions must spread evenly on the fingers and allow for the transfer to the interpreting surface. The standard item is printer's ink, which is a heavy, black paste. Other substances, when applied with care, will also produce acceptable impressions:

(1) Cheap lipstick. The cheaper the lipstick the better since the oils in the cheaper brands mix better with the natural oils of the fingers.

(2) Stamp pad inks with stamp pads. These inks can be used, but stamp pad ink is very light or thin and takes a long time to dry. If possible, use a pad with a silk cloth. The silk cloth is not as likely to cause clotting as cotton cloth, thus allowing a more even flow of ink.

(3) Soot. By holding a piece of glass at an angle over an open flame, you will get a thin film of soot on the glass. Roll the finger in the soot and then on paper. This will produce a usable impression.

(4) Charred wood. Pulverize charred wood and add liquid to make a usable ink. To obtain the best results, the liquid added should have a slightly oily base.

(5) Berry juice. The juice of most berries can be used, but the impressions obtained are normally light.

(6) Shoe polish. Use polish that has a lanolin base and not a wax base. Any substance with a wax base tends to clot, causing smudged or smeared impressions.

b. Use a smooth surface to get the fingerprint impression. The surface may be of any material suitable to accept the inked impression and maintain it until the data has been interpreted. The standard item used is the FBI record card. When using it, be sure to show the correct numbering of the fingers. If FBI record cards are not available, the following items can be used:

(1) Cards, 3x5 or 5x8. Due to their heavy weight, both sides can be used. These cards may also be used for a permanent fingerprint file.

(2) Magazines. A magazine, especially one with a "slick" surface, has an excellent surface for temporary prints. Although not all of the magazine can be used, normally several pages will have large borders that can be used to "print" a few individual prints.

(3) Newspaper. The paper used for newspapers holds ink; therefore, it is not the best type of surface to use. By soaking in water, newspapers can be bleached out and then dried in the sun. This will produce a large amount of usable paper.

(4) Glass. Flat pieces of glass, plastic, or formica may be used, but their hard surfaces make them hard to work with. Care must be taken to avoid smearing the impressions.

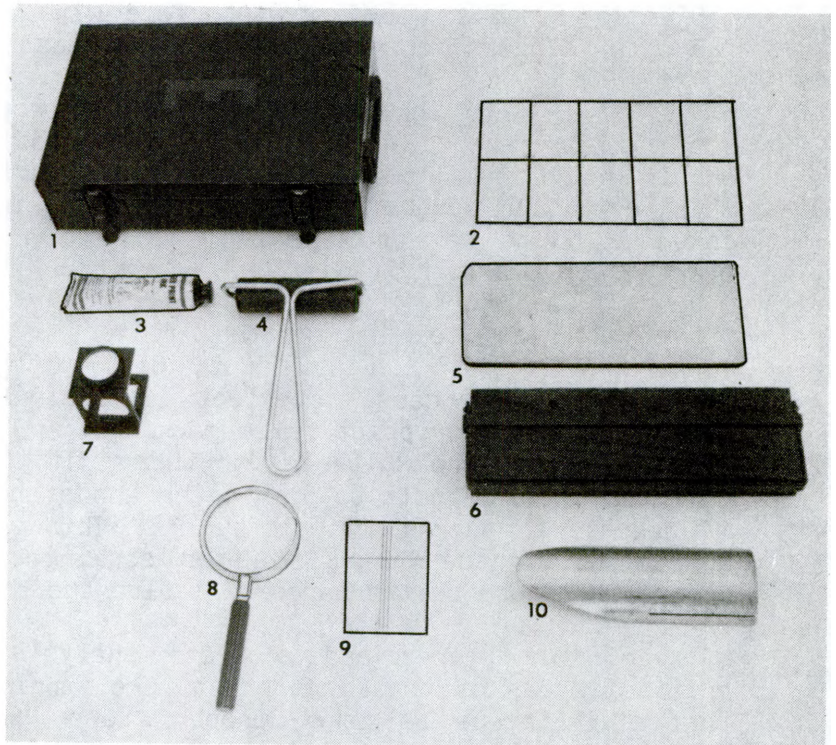
(5) Wood. A flat piece of wood sanded or painted smooth makes an excellent surface. It has the added advantage of being reusable simply by being cleaned, sanded, or repainted.

c. Because of the amount of detail in a fingerprint impression, a magnifier will normally be needed to interpret the data. Any simple two-power magnifier, such as a reading glass or pocket magnifier, will suffice. Some optical equipment lens will also serve as a magnifier. Regardless of the type of magnifier used, it should be mounted on some type of stand so that the analyst can have both hands free when working with the impressions.

d. The final item needed is a fine line. It is used to limit the area of interest in interpretation of the fingerprint impressions. The fine line is used to connect the "focal points" of the impression. It must be long enough to connect the focal points and be no wider than any ridge line. The sighting wire of a lensatic compass or any other fine wire may be used as a fine line. Where records will be continually used for reference, it is often preferred to draw the fine line permanently on the impression with a hard lead (3H or harder) pencil.

e. The following figure shows a typical fingerprint kit. The kit includes:

- (1) Carrying case.
- (2) 5x8 cards.
- (3) Fingerprint ink.
- (4) Roller (used with fingerprint ink).
- (5) Inking plate (used with fingerprint ink).
- (6) Card holder.
- (7) Magnifier.
- (8) Reading glass (used as magnifier).
- (9) Template.
- (10) Curved spatula (used for deformed fingers).



Typical fingerprint identification system (FIS) kit.

2. To get the best possible results, you should apply certain techniques.

a. The first step is to insure that all the necessary equipment is available, clean, and in working order.

b. The next step is to select an area to take the impressions. A private area is preferred. It must also have a sufficient source of light.

c. Next, organize the printing area. This entails arranging the working surface and "inking" the printing plate.

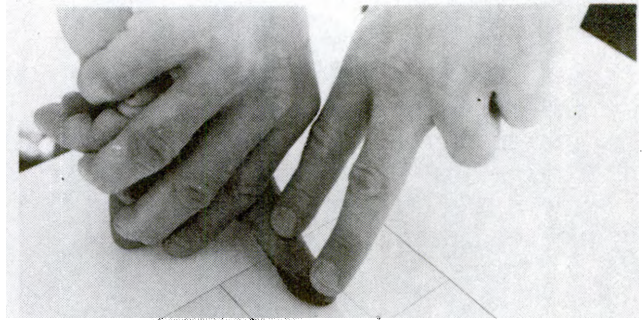
(1) Preferably, the working surface should be arranged so that the subject who is having his fingerprints taken stands in front of and at forearm's length from the surface. The height of the surface should be even with the subject's elbow when his arm is hanging naturally from his shoulder (when the arm is bent to a right angle, the forearm will be even with the surface). The card and inking plate should be mounted at the edge of the surface so that the subject's fingers will not interfere with the manipulation of the other fingers during the printing process.

(2) To ink the printing plate properly, two or three small daubs (about the size of a matchhead) of printer's ink should be placed on the plate and thoroughly rolled until a thin, even film covers the entire surface. You should check the inked plate to be sure the film is neither too heavy (smudged prints) nor too light (undefined prints).

d. Prior to inking the fingertips, insure that the fingers are clear. Lint, dust, dirt, or gummed ink in the pattern area can cause imperfect impressions, void identifying characteristics, or print false markings. Alcohol, gasoline, or soap and water are suitable for this. If the skin is rough or callused and difficult to print, the hands should be washed and, if necessary, soaked in warm water. This will soften the skin and bring out the ridges. After soaking, thoroughly dry the hands. Moisture on the hands will blur the prints.

e. For proper and accurate analysis, insure that all critical areas of the fingerprints are imprinted. This requires that the fingers be inked properly and "rolled" rather than "pressed" to obtain the impressions. In taking rolled impressions, the bulb of the finger is placed at right angles to the surface and then turned or rolled until the bulb faces in the opposite direction. To obtain uniform impressions, take advantage of the natural finger movement; turning the finger should always be from the awkward to the easy position. This relieves strain and leaves the fingers relaxed so that on the completion of the rolling, they may be lifted easily from the surface without slipping. Slipping causes the prints to smudge and blur.

(1) If you hold your arms in front of you with the backs of your hands touching each other, your hands feel strained and awkward. If you turn your hands over so they are palm to palm, they are in a comfortable position. When taking fingerprints, the fingers are rolled by starting in the awkward position and ending with them in the comfortable position; that is, they are rolled away from the center of the subject's body.



Starting the roll of the right index finger.

(2) If you hold both hands in front of you, palms up and thumbs extended, you will feel some strain, and the inside edges of the thumbs will be down. If you hold both hands in front of you with the palms down, you will find this is a comfortable position, and the outside edges of the thumbs are down. Therefore, in rolling the thumbs, roll toward the center of the subject's body.



Completing the roll of the right thumb.

f. To take a set of fingerprints, be sure that each finger is inked evenly from the tip to below the first joint and from nail edge to nail edge. Ink and print each finger separately; do not ink all fingers at once.

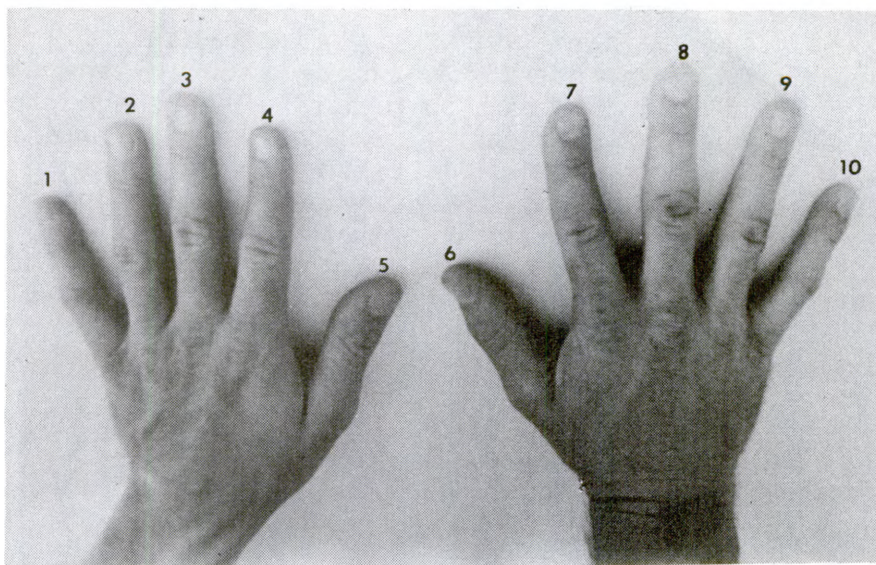
g. In inking and taking rolled impressions, the amount of pressure used is important; this can best be determined through experience and observation. It is quite important, however, that the subject relax and not exert any pressure as this will prevent the operator from gauging the amount of pressure needed. One way to get the subject to relax his hand is to have him look at the opposite wall instead of his hands. It also helps if you can stand between the subject and the working surface.

h. The procedure for inking the fingers is the same as that described for taking the prints. Never roll a finger back and forth on the inking plate to get enough ink. If you do not get enough ink the first time, re-ink on another portion of the inking plate. Never ink a finger at a place on the inking plate where a finger has been previously inked. This will result in uneven inking, causing missed or voided characteristics.

i. A slightly different procedure is used in applying lipstick to the fingers to take a set of impressions. Lipstick is applied directly to the fingers. In order to coat the fingers uniformly, the lipstick is applied in one sweeping motion beginning below the first joint and ending at the tip of the finger. Since more than one motion is normally needed to cover a fingerprint, you must allow for a slight overlap in each subsequent application. Never use a back-and-forth motion as this will fill in the furrows between the ridges, causing smudged and blurred impressions.

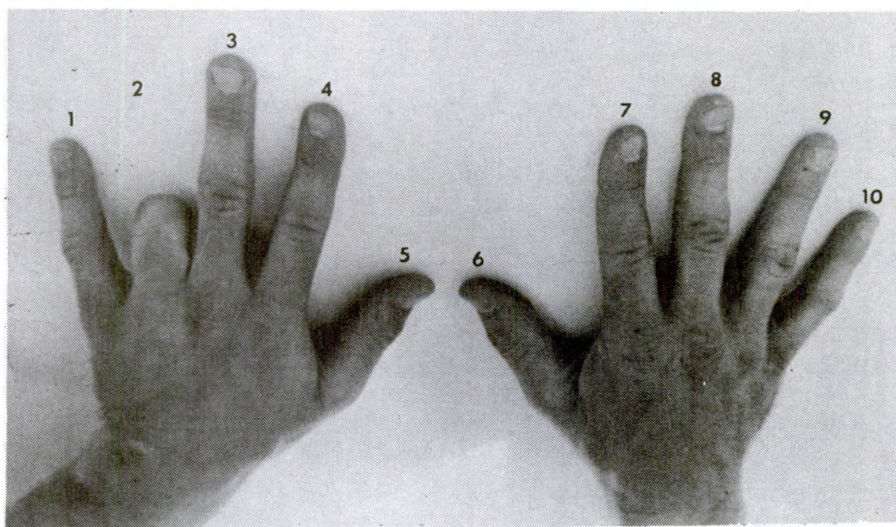
3. The standard method of numbering the fingers in the fingerprint identification system (FIS) permits the data to be transmitted in a message without numbering the data for each finger. It only requires that the data be transmitted in proper order--the data for the first finger appearing first in the message, followed by the data for the second finger, etc. This procedure also insures that operators at various locations will derive the same information from received messages dealing with fingerprint identification.

a. The FIS is devised for 10 fingers. In the FIS, the fingers are always numbered, palms down, starting with the little finger on the left hand as finger number 1 and proceeding across the back of the hands; each finger in its order to the little finger on the right hand is numbered (see figure on following page). Therefore, in the standard method of numbering, the fingers of the left hand will always be numbered 1 through 5, and the fingers of the right hand will always be numbered 6 through 10.



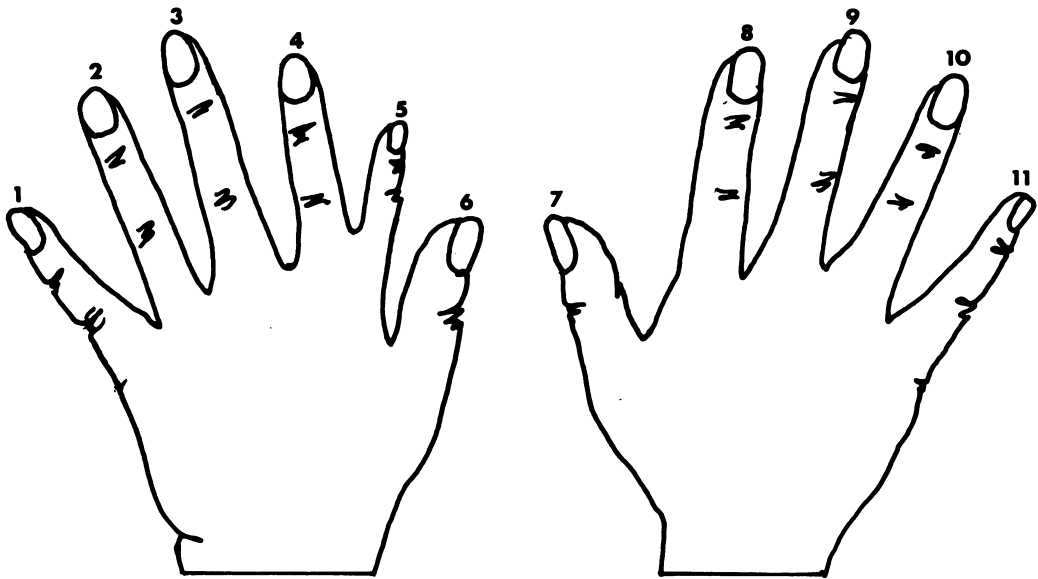
Standard numbering of the fingers.

b. When a finger or fingers are missing, the numbers stay as if all fingers were present. For example, if the ring finger of the left hand is missing, the little finger on the left hand is still number 1, the missing finger is number 2, the middle finger on the left hand is still number 3, and so forth (see figure below). The same would be true if the left hand were missing. The missing fingers of the left hand would still be numbers 1 through 5, and right hand fingers would still be numbers 6 through 10 beginning with the thumb and ending with the little finger. The missing fingers would be reported in the fingerprint message.



Numbering when finger is missing.

c. An individual with 11 or more fingers presents a special situation. The first consideration for any additional finger is that it must have an identifiable fingerprint; then it will be given the number in the sequence where it appears, using the rule counting from left to right, palms down. If the additional finger does not have an identifiable fingerprint, it is not included in the finger count. All additional fingers, regardless of whether or not an identifiable fingerprint exists, should be reported in the FIS message.



Numbering of extra fingers.

4. Everyone, from the novice to the expert, will have some difficulty taking and interpreting fingerprint impressions. These difficulties can be placed into four broad categories: mechanical, temporary disabilities, permanent disabilities, and general.

a. Mechanical problems are normally the result of poor equipment or the use of improper techniques; for example, poor ink, dirty equipment, improper rolling, or wrong amounts of pressure. Experience, practice, and care will minimize these problems.

b. Cuts, scratches, blisters, and wounds fall in the category of temporary disabilities. Given time, these problems

will cure themselves. If the time is not readily available, extreme care and patience must be taken to obtain the best possible impressions in spite of the disabilities.

c. Some of the physical disabilities encountered in taking fingerprint impressions are permanent. The system provides for some of these permanent disabilities, such as missing or extra fingers. Other permanent disabilities, such as deformed or mutilated fingers, may require the use of special equipment, such as the curved spatula, or special techniques. In addition, the operator will have to be extra careful to obtain the best possible impressions.

d. The final category--general--deals primarily with operator errors made in the interpretation of the impressions and the transmission of fingerprint data. Misinterpretation of impressions, misuse of the brevity code, incomplete data, or transmission of data in the wrong sequence are examples of these errors. The operator's attention to detail will eliminate most of these problems.

5. For permanent record purposes, the standard method of fingerprinting should be used. Only professional equipment (printer's ink, inking plate, and roller) and standard fingerprint cards should be used. A typical FIS record card format is shown in the following figure. Prints should be rolled to insure recording of all the critical print area. In addition, care should be taken to insure that all prints are clear and unsmudged, since the headquarter's set of prints will be used to establish the bona fides of an individual at a time when he will not be available to headquarters.

Name _____		Date of Birth _____	
Nationality/Citizenship _____		Branch of Service _____	
Blood Chit No. _____			
1	2	3	4
5	6	7	8
9	10		

REFERENCE:

ST 31-194, Fingerprint Identification System, Mar 78 (chap 2)

331-915-0630

SELECT DROP ZONES

CONDITIONS:

You will be given weather conditions, a map, coordinate scale and protractor, paper, pencil, and mission statement for each type drop zone.

STANDARDS:

Within 1 hour:

1. Plot a primary drop zone on a map and list the considerations used in selection.
2. Plot an alternate drop zone on a map and list the considerations used in selection.
3. Plot an area drop zone on a map and list the considerations used in selection.

PERFORMANCE MEASURES:

1. Considerations for Selecting DZs.

a. Terrain. The general area surrounding the site should be relatively free from obstacles which may interfere with safe flight. Flat or rolling terrain is desirable. In mountainous or hilly terrain, however, broad ridges and level plateaus can be used. Small valleys or pockets completely surrounded by hills are difficult to locate and normally should not be selected.

(1) Approach. It is desirable that the aircraft be able to approach the DZ from any direction and that there be an open approach quadrant of at least 45° to allow the aircrew flexibility to assume the appropriate approach track (fig. 1).

(2) Turning radius. DZs having a single clear line of approach are acceptable, provided there is a level turning radius (2 nautical miles on each side of the site for medium aircraft; 1 nautical mile for STOL aircraft) (fig. 2).

NOTE: A nautical mile is approximately 15 percent more than a statute mile.

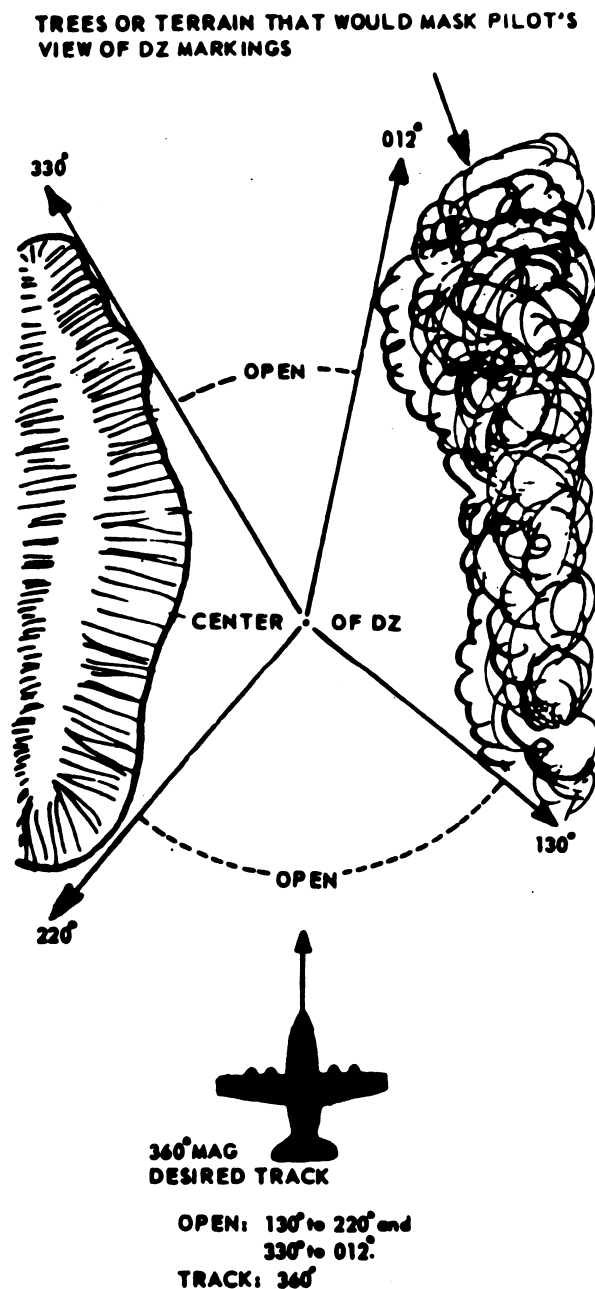


Figure 1. Computation of open quadrant and aircraft track (desired heading).

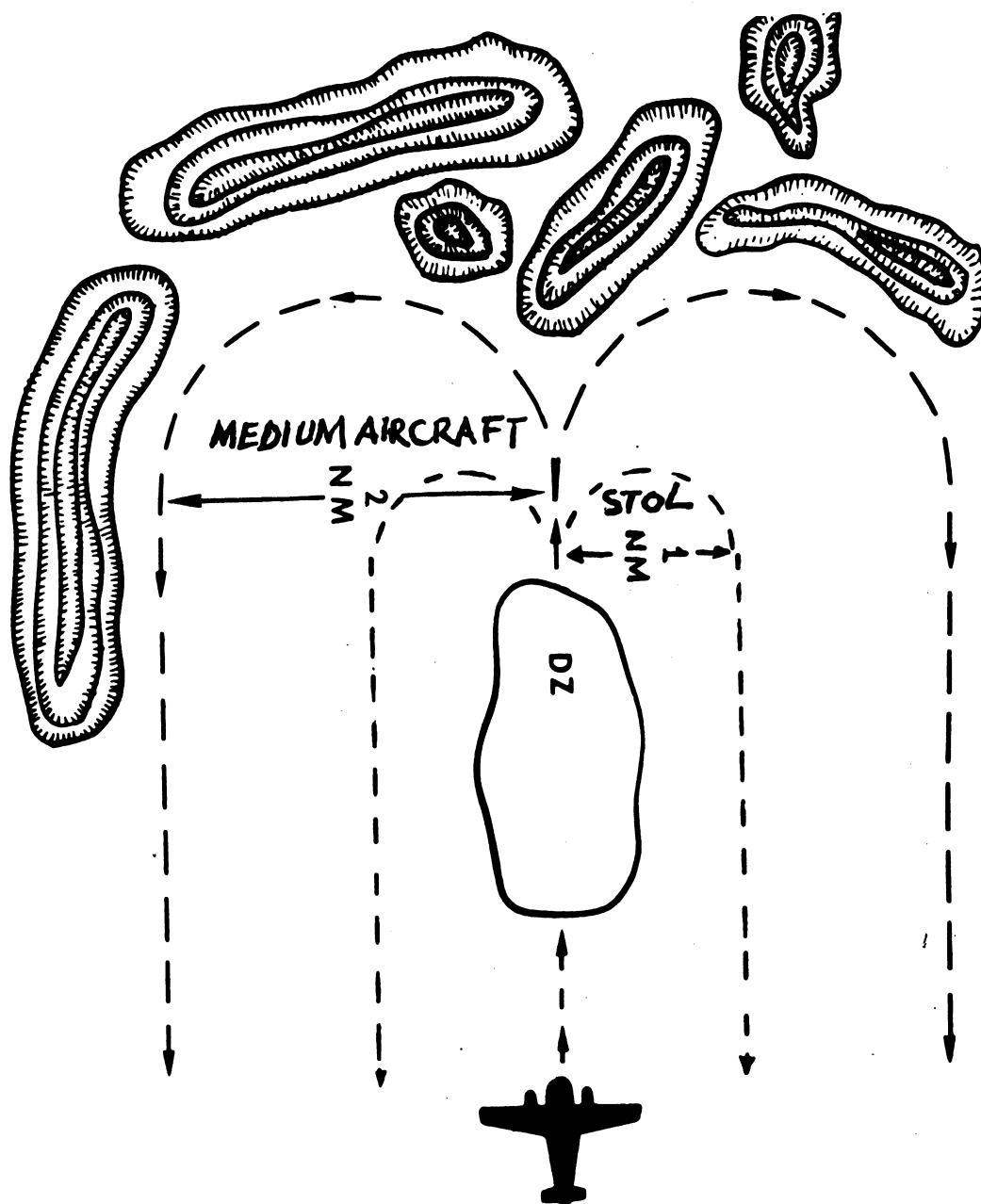


Figure 2. Level turning radius required for one-approach DZs.

(3) Hills. Rising ground or hills of more than 1,000 feet/300 meters should normally be no closer than 2 nautical miles to the DZ. (In areas where the above criteria cannot be met, the deviation will be noted in the mission request and forwarded by the SFOB/FOB to the air support unit for decision/consideration.)

b. Weather. The seasonal weather conditions in the drop area must be considered. Ground fogs, mists, haze, smoke, and low-hanging clouds may interfere with the pilot's observation of DZ markings. Excessive winds also hinder operations.

c. Obstacles. Due to the low altitudes at which operational drops are conducted, obstacles in excess of 300 meters above the level of the DZ and within a radius of 2 nautical miles must be identified. When operational drops are scheduled for altitudes of less than 400 feet, obstacles in excess of 30 meters must be identified (fig. 3).

d. Shape and size.

(1) The most desirable shapes for DZs are square or round. The width of rectangular-shaped DZs should allow for minor errors in computation of wind drift. Minimum width for personnel drop is 305 meters.

(2) The required length of a DZ depends primarily on the number of chutes to be dropped and the length of their dispersion pattern.

e. Surfaces.

(1) The ground surface of the DZ should be reasonably level and relatively free from obstructions such as rocks, trees, fences, and powerlines. Tundra and pastures are ideal terrain for both personnel and cargo reception.

(2) Personnel DZs located at comparatively high elevations (6,000 feet or higher) will, where possible, be on soft snow or grasslands. The increased rate of parachute descent at these altitudes makes these DZs less desirable than those at or near sea level.

(3) Swamps, paddies, and marshy ground are marginally suitable for personnel and bundles in the wet season. The presence of water compounds recovery problems and is hazardous. Frozen paddies present a rough, hard surface, marginally suitable for personnel drops.

(4) Water depth will be no less than 4 feet for a personnel drop on a water DZ. There will be no underwater obstructions to a depth of 4 feet, and the surface will be clear of floating debris or moored craft without protruding boulders, ledges, or pilings. Minimum safe water temperature for personnel drops is 50° F. (+ 10° C.).

(a) Water reception points will not be near shallows or where currents are swift.

(b) Arrangements must be made for rapid pickup.

f. Security.

(1) The DZ should provide maximum freedom from enemy ground interference and be accessible to the reception committee by routes which are concealed from enemy observation or which can be secured against interdiction or ambush.

(2) Additionally, the DZ should be near areas suitable for the caching of supplies and the disposition of air delivery equipment. **[OBSTACLE]**

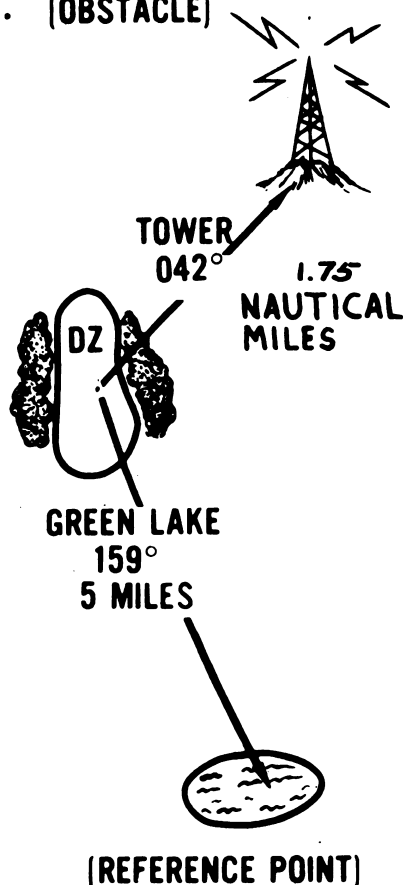


Figure 3. Reporting obstacles and reference points.

2. Dispersion Pattern.

a. Dispersion occurs when two or more personnel or containers are released consecutively from an aircraft in flight. The long axis of the landing pattern generally parallels the direction of flight.

b. Compute dispersion using the formula one-half speed of aircraft (knots) times exit time (seconds) equals dispersion in meters. Exit time is the elapsed time between the exits of the first and last items (fig. 4).

Use this formula: $D = ST$.

D = unknown dispersion pattern in meters.

S = $1/2$ speed of aircraft in knots.

T = exit time in seconds. It is calculated by multiplying the number of jumpers/containers to be dropped by 1 second. If two aircraft doors are used simultaneously, divide the calculated exit time by 2.

Example:

$S = 55$ knots.

$T = 7$ seconds. (Twelve jumpers and two cargo containers are to be dropped using two aircraft doors: $12 + 2 \times 1 \text{ second} = 14$ divided by 2 = 7 seconds.)

$D = 55 \times 7 = 385$ meters.

NOTE: For personnel drops, a 100-meter safety factor is added to each end of the computed ground dispersion pattern. Therefore, using the above figures, $D = 385 + 200 = 585$ meters.

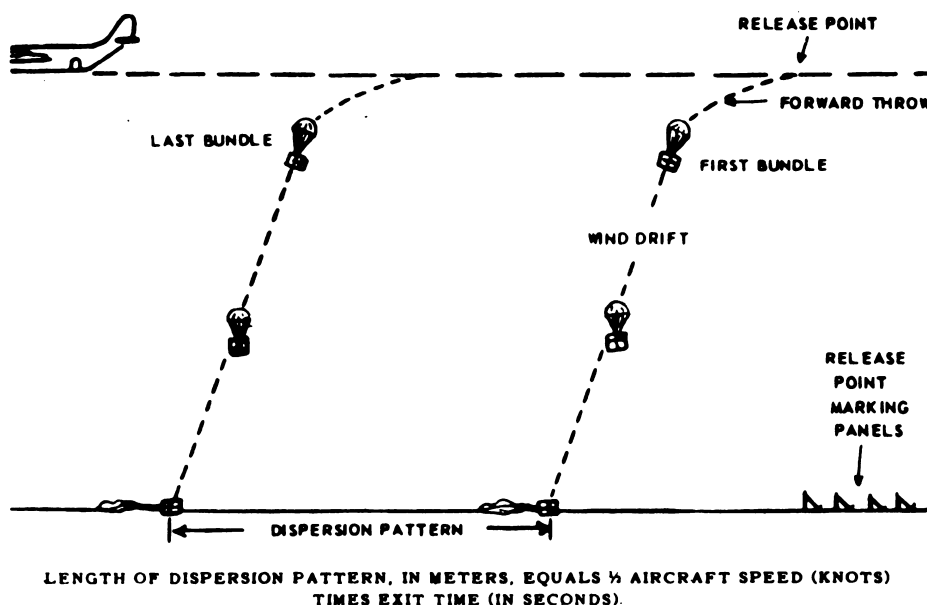


Figure 4. Computation of dispersion.

3. Alternate Drop Zones.

a. Alternate DZs will be designated for every mission requested. They differ from the primary DZ in that separate drop times are established and the alternate DZ is manned by a skeleton reception committee.

b. If the primary DZ is not suitable for reception due to unfavorable conditions, the aircraft proceeds to the alternate DZ. This DZ should be as close to the aircraft primary heading as possible to preclude turnaround and possible enemy detection of the operation.

c. Drop times for alternate DZs are determined by the air support unit based on flight time and are included in the mission confirmation message from the SFOB.

4. Area Drop Zone.

a. Selection. An area DZ consists of a prearranged flight track over a series of acceptable drop sites. This establishes a line of flight between two points, "A" and "B" (fig. 5).

(1) The distance between these points should not exceed 15 miles and should have no major changes in ground elevation in excess of 300 meters.

(2) Drop sites may be selected not more than one-half nautical mile/1 kilometer to the left or right of the established line of flight.

(3) The aircraft arrives at point "A" at the scheduled time and proceeds toward point "B," observing for the DZ markings. Once the markings are located, the drop is conducted in a normal manner.

b. Identification. Area DZs are identified using the normal DZ procedures, with the following exceptions:

(1) Locations of both point "A" and point "B," including reference points (fig. 5), must be identified.

(2) The open quadrant is not reported.

(3) If you are in a field environment, obstacles over 91 meters above the level of the terrain along the line of flight, within 2 nautical miles on either side, and not shown on the issued map (fig. 6), are identified in reference to either point "A" or point "B."

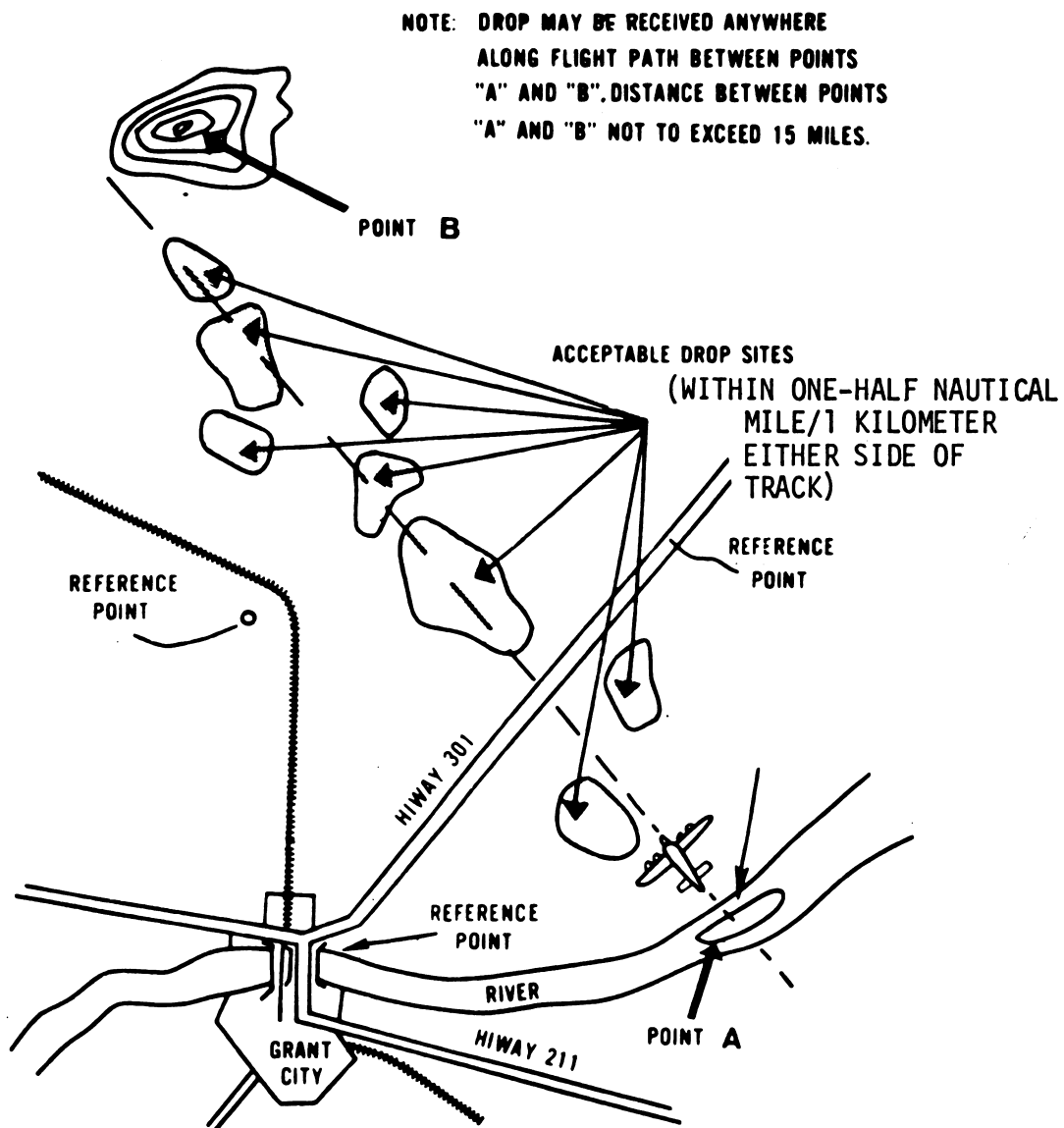


Figure 5. Area DZ (reference points).

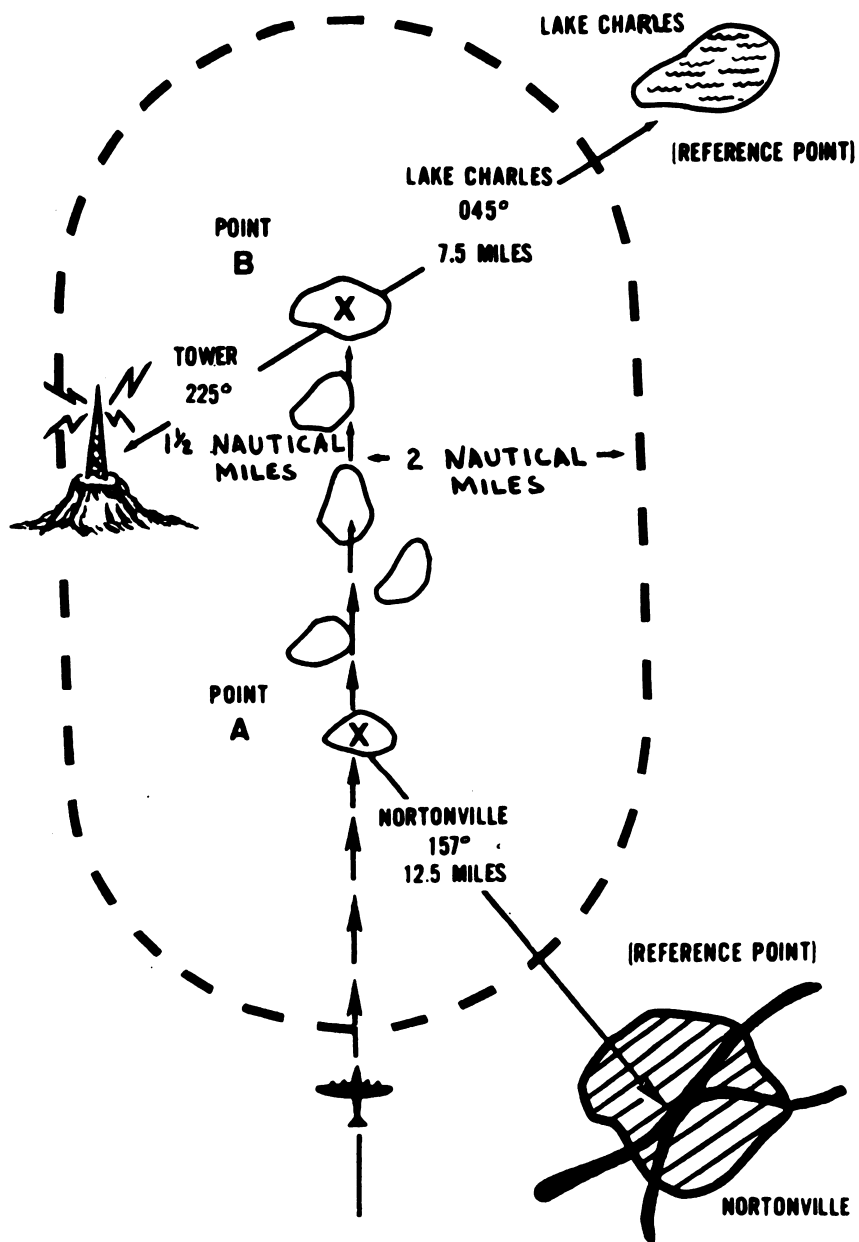


Figure 6. Obstacles and reference points (area DZ).

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (sec II and III, chap 6)

331-915-0631

MARK A DROP ZONE FOR A PERSONNEL
OR LOW-VELOCITY CARGO DROP

CONDITIONS:

In a field environment, you will be given marking devices, a compass, an anemometer, personnel to man the markers, unit CEOI, and a mission statement containing all critical information.

STANDARDS:

Within 1 hour, compute the ground release point and mark the drop zone with a standard pattern inverted "L."

PERFORMANCE MEASURES:

1. Compute the Ground Release Point.

a. You must determine:

(1) Dispersion--the length of the pattern formed by the impact of the parachutists/containers. (See task number 331-915-0630 for the calculated dispersion pattern.)

(2) Wind drift--the horizontal distance traveled from the point of parachute deployment to the point of impact as a result of wind conditions. To determine the amount of drift, you must know wind velocity (use anemometer), drop altitude (found in mission statement), and type parachute used (found in mission statement). Use the following formula:

D = drift in meters

V = wind velocity (knots)

A = aircraft altitude in hundreds of feet

K = the constant for the type parachute used (see fig. 1)

K Factors	
2.6	for cargo parachutes (G-13)
4.0	for static line deployed maneuverable parachutes (MC1/MC1-1)
4.1	for 35-foot canopies (T-10)
NOTE: When receiving jumpers/containers in the same drop, use the K factor for personnel parachutes.	

Figure 1

To obtain drift (D), multiply the wind velocity (V) by each 100 feet of drop altitude (A) by the constant for the type parachute (K). Thus, $D = V \times A \times K$.

b. From the calculated dispersion pattern, note the desired point of impact for the first parachutist/container.

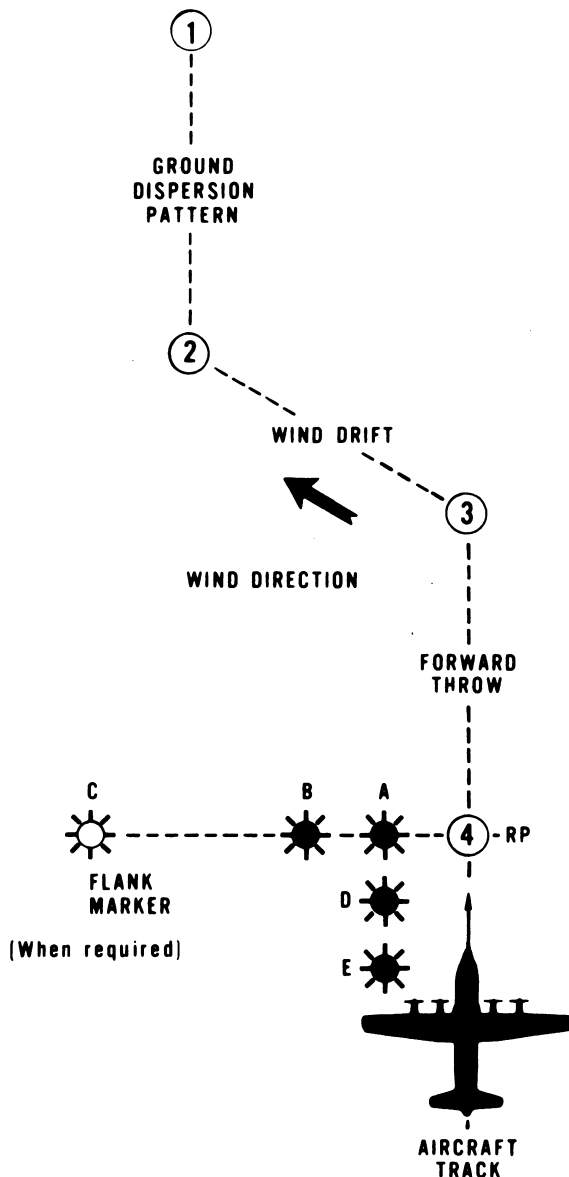
c. Forward throw is the horizontal distance traveled by the parachutist or cargo container between the point of exit and the opening of the parachute. This factor, combined with reaction time of the personnel in the aircraft, is compensated for by moving the release point an additional 185 meters in the direction of the aircraft approach (see fig. 2).

2. Mark the Drop Zone. The purpose of DZ marking is to identify the site, indicate the point over which personnel/cargo will be released, and provide visual terminal guidance for the aircraft. The patterns for marking DZs are included in the CEOI.

a. Types of markers:

(1) During daylight, panels, smoke grenades, or smudge fires may be used. If panels are not available, sheets, strips of colored cloth, or other substitutes can be used provided there is sharp contrast with the background.

(2) During darkness/low visibility, flashlights, fires, or improvised flares may be used.

**LEGEND**

- ① Impact point of last jumper/container.

Distance 1 to 2: Computed ground dispersion pattern.

- ② Desired impact point of first jumper/container.

Distance 2 to 3: Computed wind drift.

Distance 3 to 4: Compensation for forward throw.

- ④ Location of release point (RP)

TO MARK THE RELEASE POINT

1. After selecting the desired impact point (Point 2), compute the ground dispersion pattern. Starting at Point 1, face into the direction of aircraft approach and pace off the computed distance, Point 1 to 2.

2. At Point 2, face into the wind direction and pace off the computed wind drift distance, Point 2 to 3.

3. At Point 3, face into the direction of aircraft approach and pace off the constant forward throw distance, Point 3 to 4.

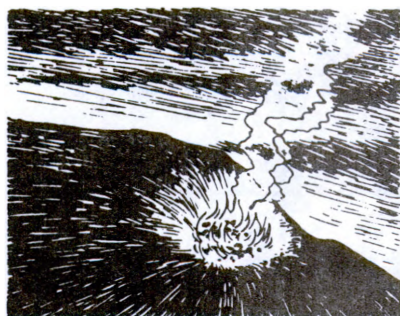
4. You are now standing at or under the release point, Point 4.

5. TO POSITION DZ MARKERS: At Point 4, face into the direction of aircraft approach, position marker A 50 meters to your right, and marker B 50 meters to the right of marker A. Position markers D and E at 50-meter intervals forward of marker A into the direction of aircraft approach.

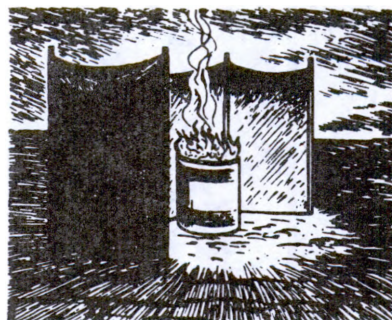
NOTE: PLACEMENT OF MARKERS ARE VIEWED FACING AIRCRAFT APPROACH TRACK.

Figure 2

NOTE: Security must always be considered in selecting the type of marker and in placing it. All flashlights should be hooded for security (side glow) and aimed in the direction of the expected aircraft approach. Fires or improvised flares are screened on three sides or placed in pits with sides showing toward the direction of the aircraft's approach (fig. 3).



FIRE PIT



FIRE SCREEN



FLASHLIGHT HOOD

Figure 3. Security of DZ markings.

b. Placement of markers:

(1) The standard marking method employs a standard four-marker pattern positioned in the form of an inverted "L." For night drops, an additional flank marker is used (see fig. 2).

(2) The distance between markers is usually 50 meters.

(3) In executing drops, the aircraft is aligned as accurately as possible 50 meters to the right of the right-hand row of markers. The drop is made when the aircraft becomes adjacent to the last light in the right-hand row.

(4) Markings must be clearly visible to the pilot of the approaching aircraft. The formula for determining mask clearance is 15 units of horizontal distance to 1 unit of vertical distance (a ratio of 15 to 1 for each unit of obstruction). As an example, markings shown in figure 4 are placed 1,500 feet from a 100-foot mask of vegetation and a terrain feature.

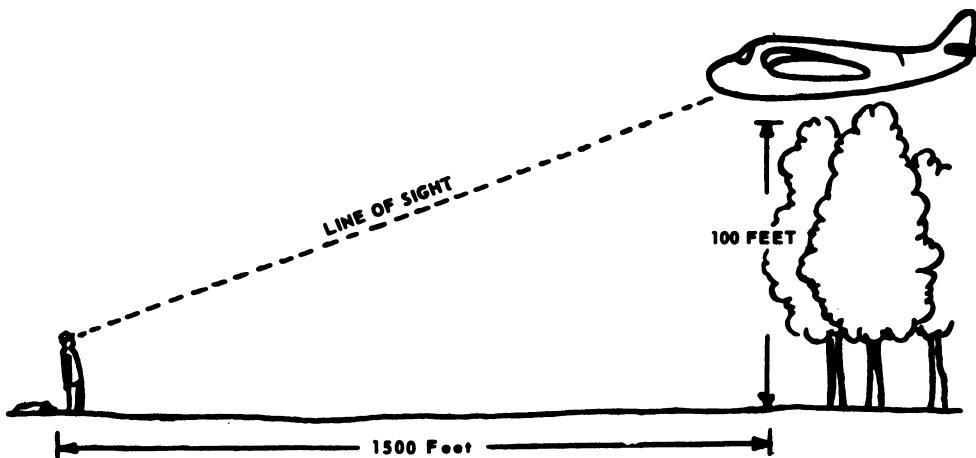


Figure 4. "Mask" clearance ratio 15:1.

(5) When panels are used for daylight DZ marking, they are positioned at an angle of approximately 45° from the horizontal to present the maximum surface toward the approaching aircraft. If the drop is taking place during the period of sunrise or sunset, and the sun is in the eyes of the pilot during the approach to the DZ or LZ, smoke grenades or simple smudge fires should be used in conjunction with panel markings to assist in sighting the DZ markings on the approach.

NOTE: High-velocity and free-drop loads are not materially affected by wind conditions; therefore, wind drift is disregarded. Dispersion is computed the same as for low-velocity drops. Without the restraint of a parachute, forward throw is compensated for by moving the ground release point marking in the direction from which the aircraft will approach a distance equal to the altitude of the aircraft above the ground (e.g., if altitude of aircraft is 600 feet, move ground release marking 600 feet in the direction of the aircraft approach).

REFERENCE:

ST 31-201, Special Forces Operations, Nov 78 (sec IV, chap 6)

331-915-0632

RIG A RUCKSACK FOR JUMPING

CONDITIONS:

You will be given a rucksack, 40 pounds of items to pack in the rucksack, padding, lowering line, H-harness, retainer bands, quick release straps with snaps, and masking tape.

STANDARDS:

Within 20 minutes, pack and rig a rucksack for jumping.

PERFORMANCE MEASURES:

1. Pack Rucksack.
 - a. Insert items of equipment.
 - b. Place padding between load and front of rucksack. (Padding may be a blanket, poncho, or items of clothing.)
 - c. Close rucksack and engage and secure all closing straps.
 - d. Tape down all loose straps with masking tape.
2. Rig H-Harness (see fig. 1).
 - a. Lay out H-harness with intermediate friction adapters facing down.
 - b. Place rucksack on H-harness with rucksack back facing up and friction adapters touching the bottom frame of the rucksack.
 - c. Place the running ends of the H-harness over the top of the load and underneath the top portion of the rucksack frame.
 - d. Cross the running ends of the harness in the middle of the back portion of the rucksack.



Figure 1. The H-harness.

e. Place the loop(s) of the lowering line around the crossed portion of the harness straps.

f. Thread the running ends of the harness underneath the bottom portion of the rucksack frame.

g. Secure the running ends of the harness to the end friction adapters and tighten them.

3. Secure Lowering Line to Rucksack Frame (see figs. 2 and 3 for different type rucksacks).

a. Accordion-fold lowering line with each fold 19 inches long (± 1 inch).

b. Place retainer bands on the bottom outside of the rucksack frame and tuck the ends of the accordion folds through the retainer bands.

NOTE: Make sure the upper buckle and quick release on the lowering line are free.



Figure 2. Rucksack, cotton, with lowering line attached.



Figure 3. Rucksack, nylon, with lowering line attached.

4. Secure Quick Release Straps to the Rucksack.
 - a. Place rucksack with bottom up and back facing you.
 - b. Secure the quick release straps to the intermediate friction adapters on the H-harness with the open ends of the snaps facing you and the running ends of the straps facing away from you.
 - c. Make quick release folds in both quick release straps.
 - d. Fold and tape the running ends of the H-harness and secure all loose straps IAW paragraph 49, sec II, chap 3, TM 57-220.

- NOTE:
- (1) The H-harness must not be twisted.
 - (2) The H-harness must be threaded under the top and bottom and over the middle of the rucksack frame.
 - (3) The lowering line loop(s) must be around the crossing point or "x" in the H-harness.
 - (4) The accordion folds of the lowering line must be secured in the retainer bands.
 - (5) The H-harness must be secured tightly.

REFERENCE:

TM 57-220, Technical Training of Parachutists, Jun 68 (pages 70-72)

CONSTRUCT A LEAN-TO

CONDITIONS:

In a field setting, you will be given a poncho or parachute, survival knife, suspension line or similar material, and materials found in the area.

STANDARDS:

Select a site and materials needed.

Construct a lean-to that will provide protection against bad weather.

PERFORMANCE MEASURES:

1. Timber Shelter.

a. Find two trees (on flat ground if possible) slightly farther apart than you are tall.

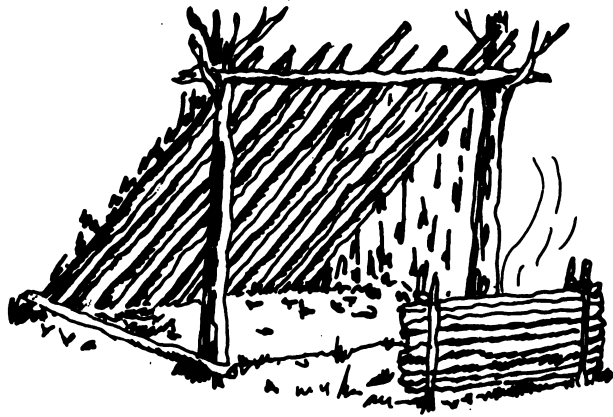
<p>NOTE: In placing the shelter, the direction of prevailing winds should be considered.</p>
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b. Cut a limb or find a pole a little longer than the trees are apart.

c. With the limb held horizontal to and 3 to 4 feet above the ground, secure it to the two trees. This can be done with vines or suspension line.

d. Cut some poles 4 to 6 feet long and lean them against the limb you placed horizontally between the two trees. Secure the poles with vines or suspension line.

e. Cut brush or boughs and interlace them on the leaning poles. Secure them.



f. The shelter can be improved by building a fire reflector opposite the opening of the lean-to.

2. Poncho Shelter.

a. Follow steps "a" through "d" for a timber shelter.

b. Stretch poncho over the frame and secure it.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 5-4)

331-919-0003

CONSTRUCT A SWAMP BED

CONDITIONS:

In a field setting, you will be given a survival knife, suspension line or similar material, poncho, parachute or similar material, and materials found in the area. (If materials needed for the task are not available in the area, they will be furnished.)

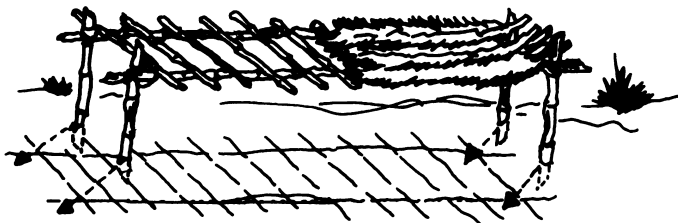
STANDARDS:

Select a site and required materials.

Construct a swamp bed that will support you and your equipment and will provide a dry place to sleep.

PERFORMANCE MEASURES:

1. Select a site keeping in mind the weather, wind, and tides.
2. Find four trees located so they form a rectangle with the corners far enough apart to allow for your height and breadth. If trees are not available, cut four sturdy stakes and place them into the ground to form a rectangle.
3. Cut two poles long enough for your height and strong enough to support your weight.
4. With the suspension line or similar material, secure the poles to the trees or stakes high enough off the ground or water to allow for tides or inclement weather.
5. Cut other poles and lay them across the two long poles.



FM 31-11C-S

<p>NOTE: If you have an air mattress, blow it up and place it on the platform.</p>
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REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 6-3c)

331-919-0004

IDENTIFY POISONOUS SNAKES

CONDITIONS:

You will be given a container containing five types of snakes, three poisonous and two nonpoisonous, or photographs of three poisonous and two nonpoisonous snakes, and a pointer. This will be done in a field or classroom setting.

NOTE: Container must meet all safety requirements, be large enough to hold a minimum of five snakes, and allow for viewing the snakes; i.e., be covered with wire or glass.

STANDARDS:

Identify the poisonous snakes.

PERFORMANCE MEASURES:

1. No single characteristic except the poison fangs and glands distinguishes a poisonous snake from a harmless one. But only in dead snakes can the fangs and glands be seen without danger. Even then the fangs may be hard to find. Although many poisonous snakes have lance-shaped or triangular heads, many do not.

2. By studying the descriptions and illustrations on the following pages, and dead specimens when available, you can learn to identify the poisonous snakes.

3. Poisonous Snakes of Southeastern Asia.

a. The cobra family (cobra, kraits, and coral snakes). These snakes can be identified positively by examining the scales of a dead specimen. If the third scale on the upper lip touches both the nostril scale and the eye, the snake is one of the cobra family. If there is also a row of enlarged scales down the rigid back, the snake is a krait.

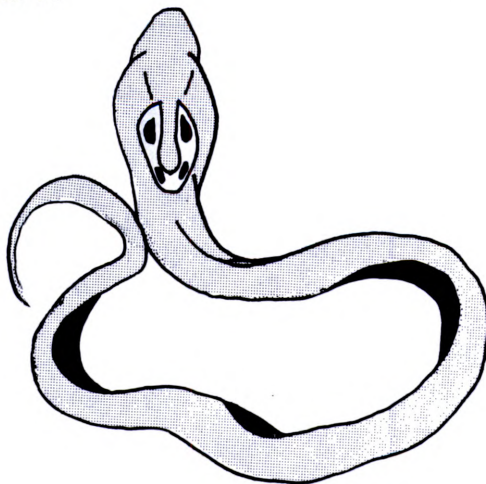


**POSITIVE IDENTIFICATION OF COBRA FAMILY
(COBRAS, KRAITS AND CORAL SNAKES)**

(1) Cobras. Cobras are the most common poisonous snakes in much of Southeastern Asia; they are particularly numerous in India where the natives will not destroy them because of religious beliefs.

(a) Description. Cobras usually (but not always) form a hood when angered. The typical combat attitude of a cobra is the raised head and spread hood. The most common species, the Indian cobra, may grow as long as 6 feet. The "spectacle" mark on the hood is typical of this species; it may be one spot or two without the bridge. The king cobras are the largest of all poisonous snakes; they average 10 to 12 feet long. Some may reach 18 feet. When compared with other cobras, the king cobra's hood is proportionately narrower.

(b) Habits. Cobras are found most frequently in rocky places or in old buildings where they feed on rats. The most common species are not particularly vicious. King cobras, however, may attack deliberately, especially if guarding eggs. Cobras are slow snakes; they always raise the head to strike. The cobra can be killed with a stout stick, swinging the stick in a plane parallel with the ground and hitting the snake at the head or raised part.

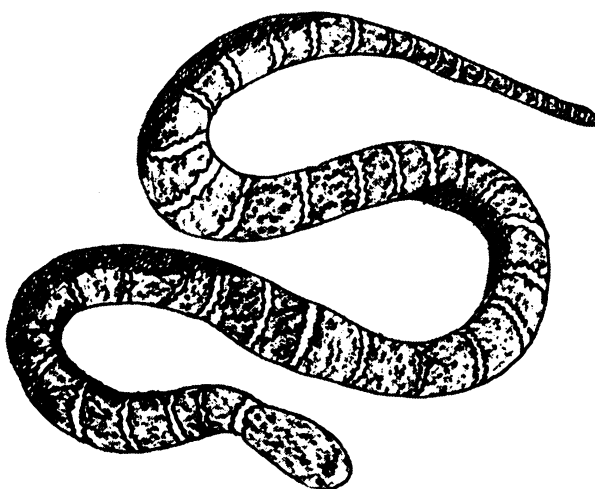


INDIAN COBRA

(2) Kraits. All kraits are very poisonous.

(a) Description. Most kraits are brightly banded in black and white or black and yellow. They have a rigid backbone on which there is a row of enlarged scales. The head is small and not much larger than the neck. Kraits average 4 to 5 feet long but may reach 6 feet.

(b) Habits. The common krait of India moves around mostly at night. It lives in open country rather than in thick jungle brush and is often found near inhabited places and on trails at night. The banded krait prefers thick jungle. Kraits are not aggressive and normally will not bite unless stepped on. To strike, a krait simply flips its head to one side or the other and bites.



MALAYAN KRAIT

(3) Coral snakes.

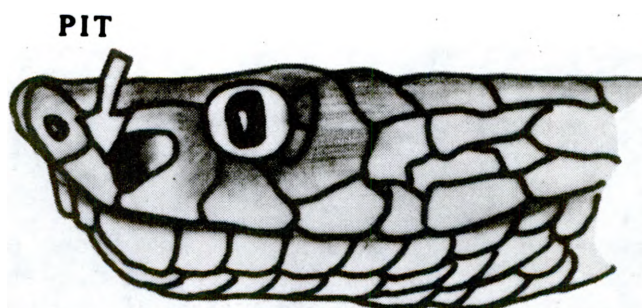
(a) Description. Coral snakes have bright red or pink bellies and brightly colored bands on the back. There are three or four species of coral snakes. They average under 2 feet long, but one species may reach 4 feet.

(b) Habits. Coral snakes are not aggressive; they stay hidden and ordinarily will not bite unless disturbed. They are seldom seen and cause very few fatalities. To bite, a coral snake simply flips its head to one side or the other.



CORAL SNAKE

b. Vipers and pit vipers. These snakes have two long and distinctive fangs; none of the other teeth are comparable in size. The fangs may be covered with a curtain of flesh or folded back into the mouth.

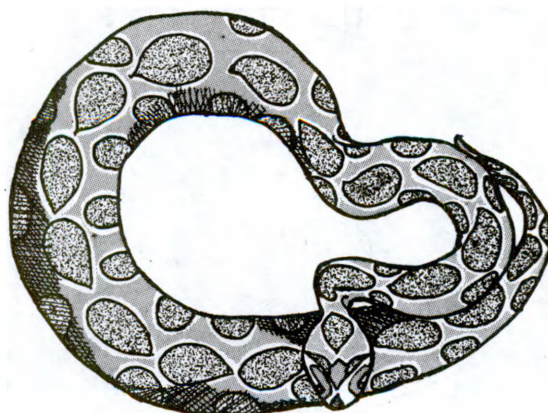


Positive Identification For Pit Viper Family

(1) Vipers.

(a) Description. Vipers usually have heads much wider than the neck. The most common and most dangerous species is Russell's viper. It is thick and will reach a length of 5 feet. It has conspicuous markings on the back, consisting of three rows of spots with reddish or brown centers surrounded by black rings bordered with white. The saw-scaled viper is another dangerous species. It is a small snake, about 2 feet long, generally light in color with dark quadrangles. The side scales are rough and somewhat saw-toothed. When disturbed, this snake writhes vigorously and makes a hissing noise.

(b) Habits. Russell's viper prefers open, sunny spots but can be found almost anywhere except in thick jungle. It is not very vicious and will not strike unless it is irritated. The saw-scaled viper is vicious and bites readily; vipers only a foot long have been known to kill. They prefer desert or dry areas and are not found in thick jungle.



RUSSELL'S VIPER

(2) Pit vipers.

(a) Description. Pit vipers may be slender or thick-bodied. Usually the head is much wider than the neck. These snakes commonly are brown with dark blotches; some types are green. The deep pit located between the eye and nostril gives them their name.

(b) Habits. India has about a dozen species of these snakes. The pit vipers are found in all types of terrain and may be found in trees or on the ground. The tree snakes are slender; the ground snakes are thicker and heavy-bodied. Only the larger ones are dangerous. One of the pit vipers of China is similar to the North American moccasin and is found in the rocky areas of the remote mountains of south China. It reaches a length of 4 1/2 feet but is not vicious unless irritated. A small pit viper, about 1 1/2 feet long, is often found on the plains of eastern China. It is too small to be dangerous to a man wearing shoes.

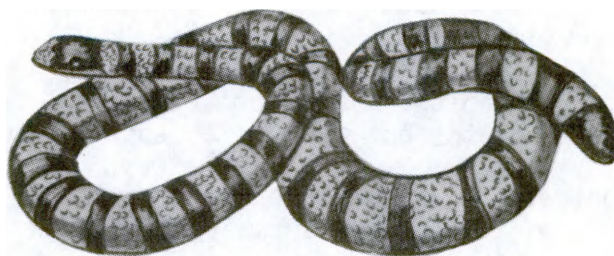


URUTÚ - PIT VIPER

c. Sea snakes.

(1) Description. Sea snakes have a flattened oar-like tail and scales. The scales distinguish them from eels. Sea snakes vary widely in color and shape. They average 4 to 5 feet in length but sometimes reach a length of 8 to 10 feet.

(2) Habits. Sea snakes are found along the coasts and at the mouths of some of the larger rivers. They may sometimes be seen in large numbers. Their bite is dangerous, but they seldom will bite unless handled. No cases are known of a deliberate attack on a man in the water.



HARDWICK SEA SNAKE

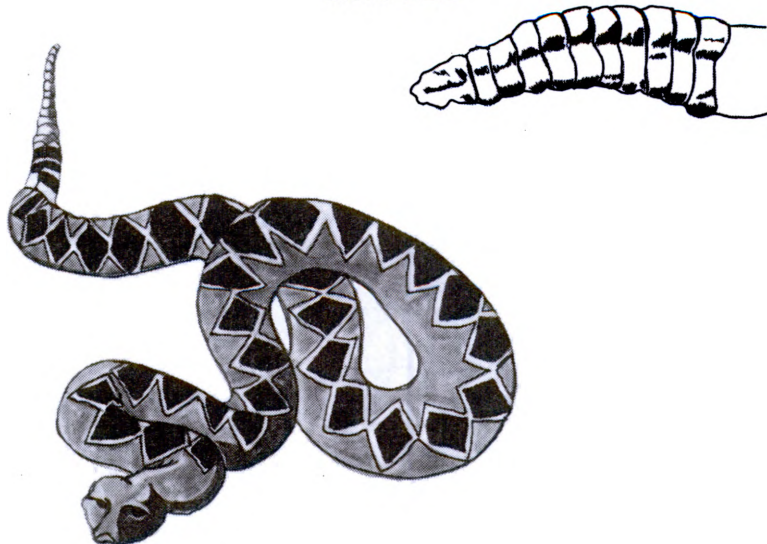
4. Poisonous Snakes of North America.

a. Rattlesnakes. There are about 27 species of rattlesnakes in the United States and Mexico.

(1) Description. The rattle on the end of the tail is the best means of identification. If the rattle is hidden, the thick body and wide head are good identifiers. In color, rattlesnakes vary from gray to black and may or may not have spots or blotches. The rattlesnake, which is related to the pit viper, has a deep pit between the eye and the nostril. It has two long fangs in the upper jaw; none of the other teeth are comparable in size. The two long fangs may be covered with a curtain of flesh or may be folded back in the mouth. Some rattlesnakes are small, and their bite is not likely to result in death. Others, such as the diamondbacks, may reach 8 feet and are very dangerous.

(2) Habits. Rattlesnakes may be found in practically any type of terrain, but they prefer open, sandy places or rocky ledges. A rattlesnake does not always give a warning rattle. When surprised, it may strike first and rattle afterward; some do not rattle under any circumstances. Most rattlesnakes will try to escape without a fight.

RATTLE

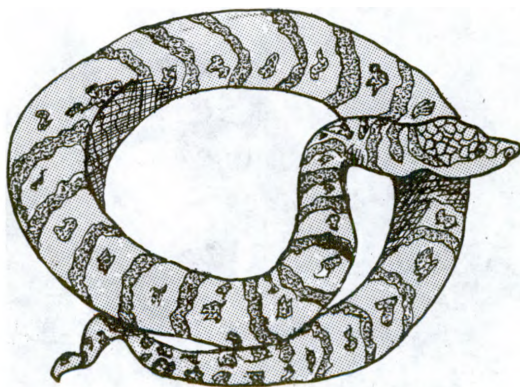


WESTERN DIAMONDBACK RATTLESNAKE

b. Water moccasins (cottonmouths).

(1) Description. The water moccasin has a thick body, and its head is wider than its neck. It is usually dull brown or olive in color and is marked with indistinct bands or blotches; the markings sometimes disappear in the larger snakes. The belly is yellowish, blotched with darker markings. Young moccasins are brilliantly colored. The mouth, when open, is white. The water moccasin averages 3 to 4 feet in length but may reach 6 feet.

(2) Habits. The water moccasin lives in or near water and is a good swimmer. Often it is seen on logs or leaning trees in swamps; it is fond of basking on branches and logs along sluggish streams, bayous, and swamps. The water moccasin will usually retreat when disturbed, but it may stand its ground, holding its mouth wide open in a threatening gesture. Its venom is very poisonous, and the bite of a large snake is often fatal.



WHITE MOUTH

COTTONMOUTH

c. Copperheads (upland moccasins).

(1) Description. The copperhead is a thick-bodied snake with a head which is wider than its neck. It is usually pale brown in color with a number of darker crossbands narrowing at the midline of the back. The markings may be few and inconspicuous on the larger snakes. The head is usually copper-red in color. The belly generally is light in color and somewhat mottled. The copperhead averages 2 1/2 feet in length, but some may reach 4 1/2 feet.

(2) Habits. In the north, the copperhead usually is found in thick forests. In the south, it may be found on dry ground almost anywhere in the field or woods. It prefers high, dry ground. Copperheads are rather timid; they usually stay hidden and when discovered, try to escape. If cornered, a copperhead may vibrate its tail producing a distinct buzzing sound in vegetation. Bites from copperheads are rare. The venom is weak and not particularly dangerous to adults.



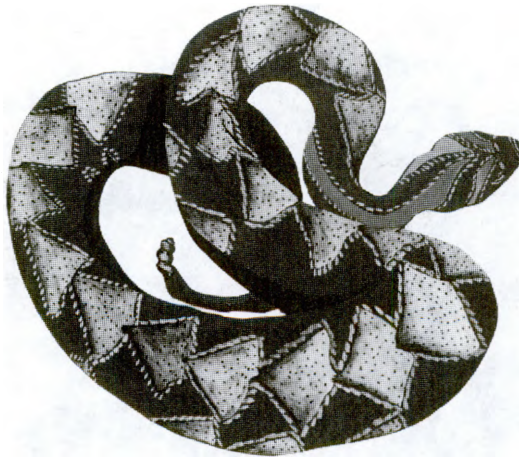
COPPERHEAD

5. Poisonous Snakes of Central and South America.

a. Rattlesnakes. Of the five kinds of rattlesnakes in Central and South America, only the tropical rattlesnake is widespread.

(1) Description. The tropical rattlesnake and its close relatives are large snakes, averaging about 5 feet long. The tropical rattlesnake has a pair of dark stripes extending along the neck and geometrical markings on the body. A smaller rattlesnake, found on Aruba Island, has a pale gray back and a white belly. The rattle on the tip of the tail identifies all the rattlesnakes. Rattlesnakes are related to the pit vipers, having a deep pit between the eye and the nostril and two long fangs in the upper jaw. (See illustration at para 3b.)

(2) Habits. The tropical rattlesnake is a vicious reptile. It is aggressive and may strike with very little warning rattle and before coiling. If teased, it may advance toward the tormentor. It is found only in dry, hilly country, not in thick forests. Its venom is highly poisonous.



TROPICAL RATTLESNAKE

b. Bushmasters.

(1) Description. The bushmaster is a large snake with a moderately slender body and a head much wider than the neck. It is light brown with a pinkish hue and has a series of dark blotches which are wide on the back and narrow down the sides. The scales are extremely rough and raised like the teeth of a rasp. The bushmaster, which is related to the pit viper, has a deep pit between the eye and the nostril. It has two long fangs in the upper jaw; none of the other teeth are comparable in size. (See illustration at para 3b.) The two long fangs may be covered with a curtain of flesh or may be folded back in the mouth. The bushmaster averages from 7 to 9 feet in length but may reach 11 feet.

(2) Habits. The bushmaster is found mostly in forests at low altitudes. It prefers dry ground and often hides in animal burrows. When lying on the forest floor, it is hard to see because of its coloring. It may remain motionless until touched, or it may attempt to escape. It may strike viciously; sometimes it may even edge towards an intruder. When irritated, the bushmaster vibrates its tail. It is a savage and dangerous snake.

DISTINCTIVE TAIL TIP

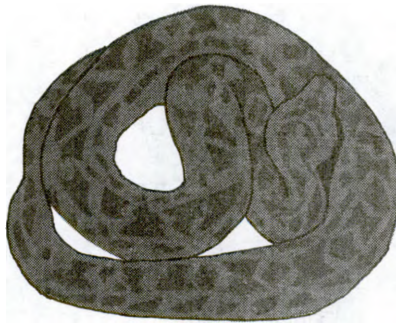


BUSHMASTER

c. Fer-de-lance group. This group of snakes is widespread throughout Central and South America.

(1) Description. The fer-de-lance and about six of its relatives are gray to brown or reddish in color, with dark geometrical blotches which generally are narrow on the back and broad at the sides. It is moderately thick with a head which is much wider than the neck. The fer-de-lance averages about 3 to 4 feet in length but may reach 8 or 9 feet. Some members of the group are smaller and display almost any color, including green or yellow; some have thick bodies. The fer-de-lance group is also related to pit vipers, having the deep pit between the eye and the nostril and the two long fangs in the upper jaw with no other teeth of comparable size. (See illustration at para 3b.)

(2) Habits. The large species are ground snakes. Some of the small ones, known as palm vipers, live in trees, especially at the base of the leaves of a palm tree. The larger snakes are dangerous. They may be common in certain areas and are often found in canefields or around dwellings where they catch rats. This snake loops its body before striking.



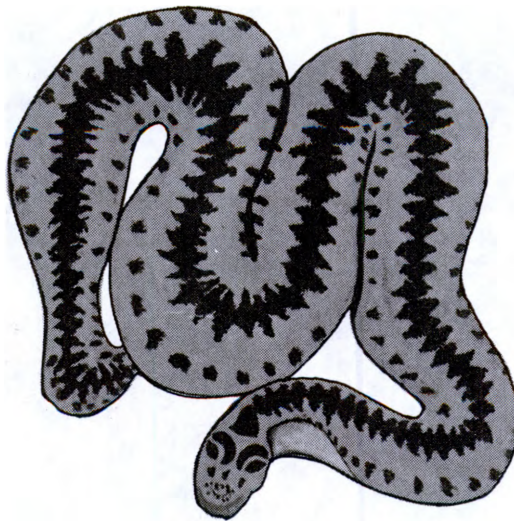
JARARACA

6. Poisonous Snakes of Europe, Africa, and the Near East.

a. European vipers. There are eight species of these vipers on the European Continent; they are sometimes called adders or asps.

(1) Description. These snakes have a short, thick body and a wide head which is much broader than the neck. Usually, there is a zigzag stripe down the back. Colors may be gray, olive-brown, reddish, or yellowish. European vipers average 2 to 3 feet in length.

(2) Habits. Vipers are generally found in the wilder areas, particularly on rocky plains, such as in the Pyrenees, the Appenines, and the Balkan Mountains where they may be found at heights up to 5,000 feet. They are found as far north as 67° in Scandinavia and across Siberia. Sunlit slopes, moors and heaths, grainfields, and trash piles are favorite prowling places. Some of the European vipers are aggressive and savage, causing occasional deaths.



EUROPEAN VIPER

b. African vipers.

(1) Description. Except for the puff adder, the vipers of North Africa are similar to those of Europe. The puff adder is a large brownish or sand-colored snake with striking markings, a heavy body, and a very short tail. It grows to a length of 5 feet. Central and South Africa have several kinds of vipers. Among the largest are the rhinoceros viper and the gaboon viper. The rhinoceros viper, found in West Africa, has horns on its nose, a very wide head, and a thick body covered with colored marks down the back; it reaches a length of 4 feet. The gaboon viper has one horn on the nose, a wide head, and thick body with oblong markings on the back and triangular colored spots on the sides; it has been known to reach a length of 6 feet. There are a number of other African vipers, most of which are small. Except for one, they have a wide head and thick body.

(2) Habits. The puff adder prefers open forest or grasslands near streams. The rhinoceros viper is found in or near streams. The gaboon viper lives in heavy forest. The bite of any of these snakes is extremely dangerous; however, these snakes are not aggressive. The smaller vipers, found in sandy country, open brush, grassland, or light forests, are likely to be aggressive and dangerous. One of the smaller kinds buries itself in the sand and may strike at a passing man; a coiling pattern in the sand will reveal its presence.

**GABOON VIPER**

c. Mambas. These snakes are found over all of Africa except in the extreme northern portions.

(1) Description. These snakes are very slender and have small heads. They generally have a green or dark, uniform color without conspicuous spots or markings. The scales are smooth, symmetrical, and large. Mambas may reach 12 feet in length. An 8-foot mamba is about half the thickness of an ordinary broomstick. The fangs in an 8-foot mamba are about one-half inch long, the thickness of a pin, and almost covered with flesh.

(2) Habits. Mambas live in trees or on the ground and have been known to enter houses in search of rats. They are very quick snakes. They may attack deliberately during their breeding season, but at other times they are timid and glide away. The bite of the mamba is very dangerous.



BLACK MAMBA

7. Poisonous Snakes of Australia, New Guinea, and the Pacific Islands.

a. Death adders. These snakes are found in most of Australia, except Victoria, in southern New Guinea, and in the Moluccas.

(1) Description. The death adder has a short, thick, clumsy body; a head much wider than the neck; and a short, thin tail. It seldom reaches more than 2 feet in length. It may be gray, brown, pink, or brick-red, depending on the sandstone of the region in which it lives and in which its coloring blends. There are bands of darker color across the body, particularly in the young snakes. The death adder has rough scales and has a spine on the tail.

(2) Habits. This snake is found in sandy areas. Since it blends with the ground it inhabits, it is hard to see. Although the snake is not quick to strike, it can be dangerous if irritated or stepped on. Its venom is highly poisonous.

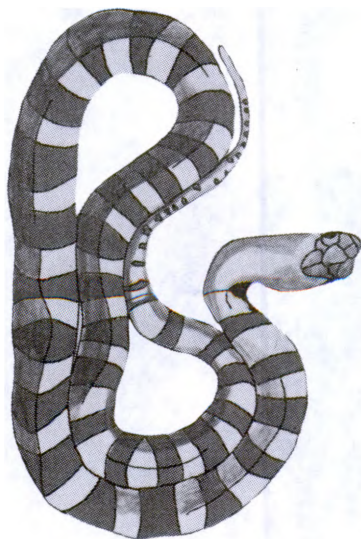


DEATH ADDER

b. Tiger snakes. These snakes range throughout Australia and Tasmania.

(1) Description. The tiger snake has dark bands on a tawny background of green, gray, orange, or brown; sometimes the bands are indistinct. It has a stout body with a rather wide head. When angry, it spreads its neck. It averages 4 to 5 feet long but may reach 6 feet.

(2) Habits. The tiger snake lives in dry country. It is a savage and dangerous reptile. In Australia, more deaths are caused by this snake than by all other snakes combined. Tiger snakes are quick to bite, spreading the neck and lunging with a flashing stroke that is so vigorous it sometimes moves the snake's body forward so that the snake seems to be making a short jump.

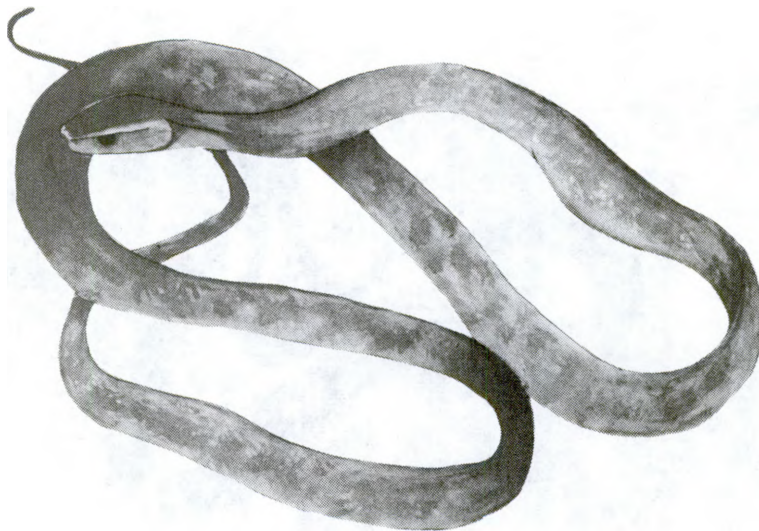


AUSTRALIAN TIGER SNAKE

c. Brown snakes. These snakes are found throughout Australia and in New Guinea.

(1) Description. The brown snake is slender with a small, narrow head. Its eyes are large. Its color is light yellow to brown or gray above and white underneath; the young are pale brown and have a pretty ringed pattern. In spite of the small size of its head, its venom is highly poisonous. This snake usually reaches a length of 4 to 5 feet.

(2) Habits. The brown snake is not aggressive unless it is disturbed. It strikes from a looped position.

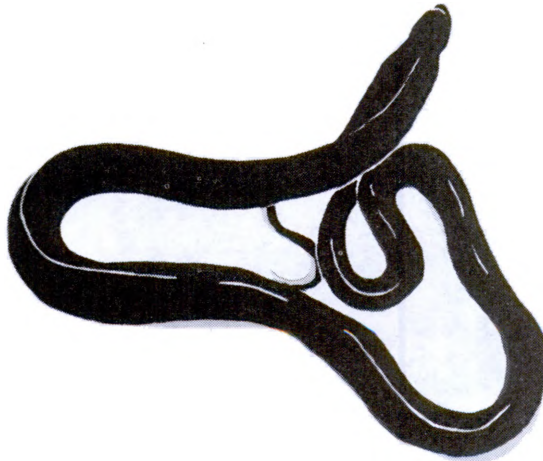


AUSTRALIAN BROWN SNAKE

d. Black snakes. These snakes are found throughout Australia except in the north and in Tasmania.

(1) Description. The black snake is blue-black on top and brilliant scarlet underneath, edged with black. The scales are symmetrical and satin-smooth. This snake has a slender body and a small, narrow head. When alarmed, it spreads its neck. It averages 6 to 7 feet in length.

(2) Habits. The black snake prefers marshy places or streams; it dives and swims well and can stay under water for long periods of time, often lying still on the bottom of a stream. It will not attack unless stepped on or cornered. When angry, it raises its head a few inches off the ground at a slant and strikes from that position. Its venom is relatively weak.



AUSTRALIAN BLACK SNAKE

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 2-19 and app C)

331-919-0005

IDENTIFY POISONOUS PLANTS

CONDITIONS:

You will be given specimens of five varieties of plants (three poisonous and two nonpoisonous) or a chart displaying photographs of three poisonous and two nonpoisonous plants, and a pointer.

STANDARDS:

Identify the poisonous plants.

PERFORMANCE MEASURES:

1. There are two types of poisonous plants. One type poisons on contact. The other poisons if eaten.

a. Plants poisonous on contact:

(1) In the United States the three most common poisonous plants are poison ivy, poison oak, and poison sumac. All have small, round, grayish-green or white fruit.

(a) Poison ivy (fig. 1) is a creeping vine with leaves growing in clusters of three. Sometimes the leaves are saw-toothed on the sides.

(b) Poison oak (fig. 1) is a shrub with leaves also growing in clusters of three, but the sides of the leaves are usually more distinctly saw-toothed than leaves of poison ivy.

(c) Poison sumac (fig. 1) is a shrub or small tree which grows in swampy places. It has smooth-edged leaflets on red stems.



Figure 1. Plants poisonous on contact.

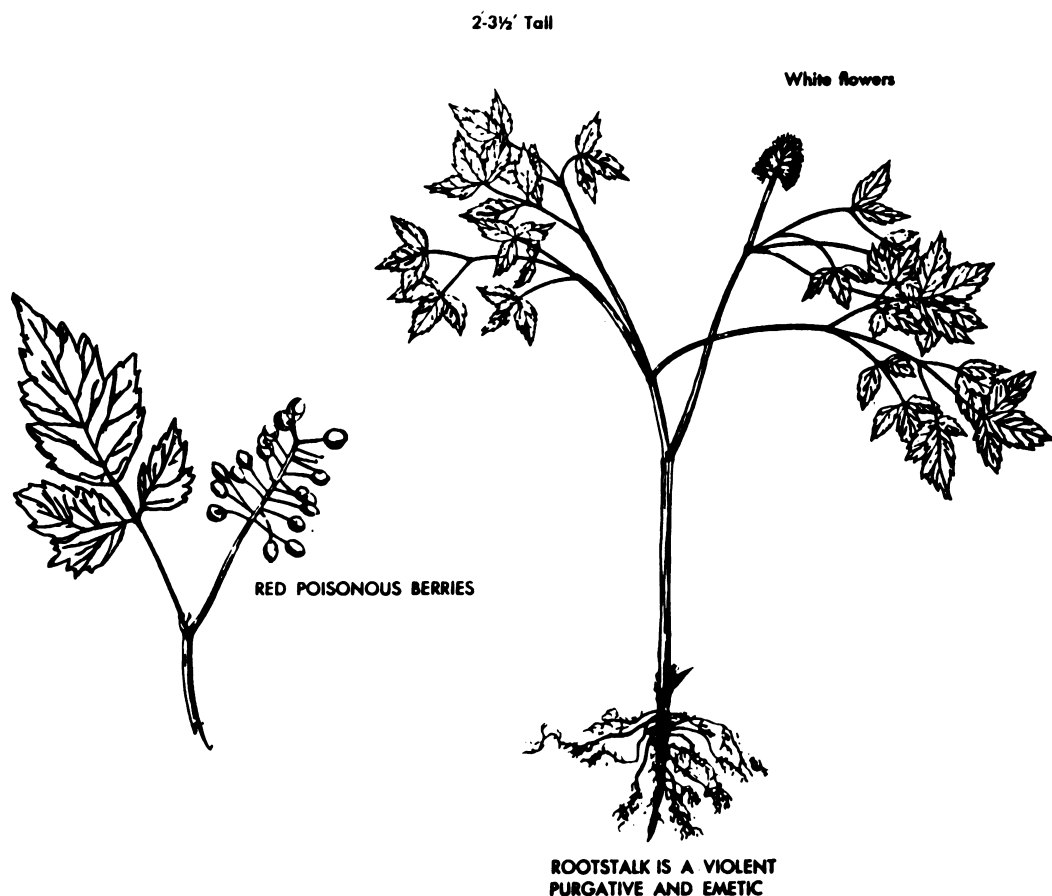
(2) In tropical regions many trees and shrubs, which belong to the same family as poison ivy and poison oak, poison on contact. The poison usually seeps from the bark and often looks like streaks of black ooze on the trunk.

(3) In the moist tropics of Southeast Asia, the leaves of the cashew nut are poisonous to some people.

(4) In the arctic and subarctic regions, no plants are poisonous on contact.

b. Plants poisonous if eaten:

(1) Baneberry:



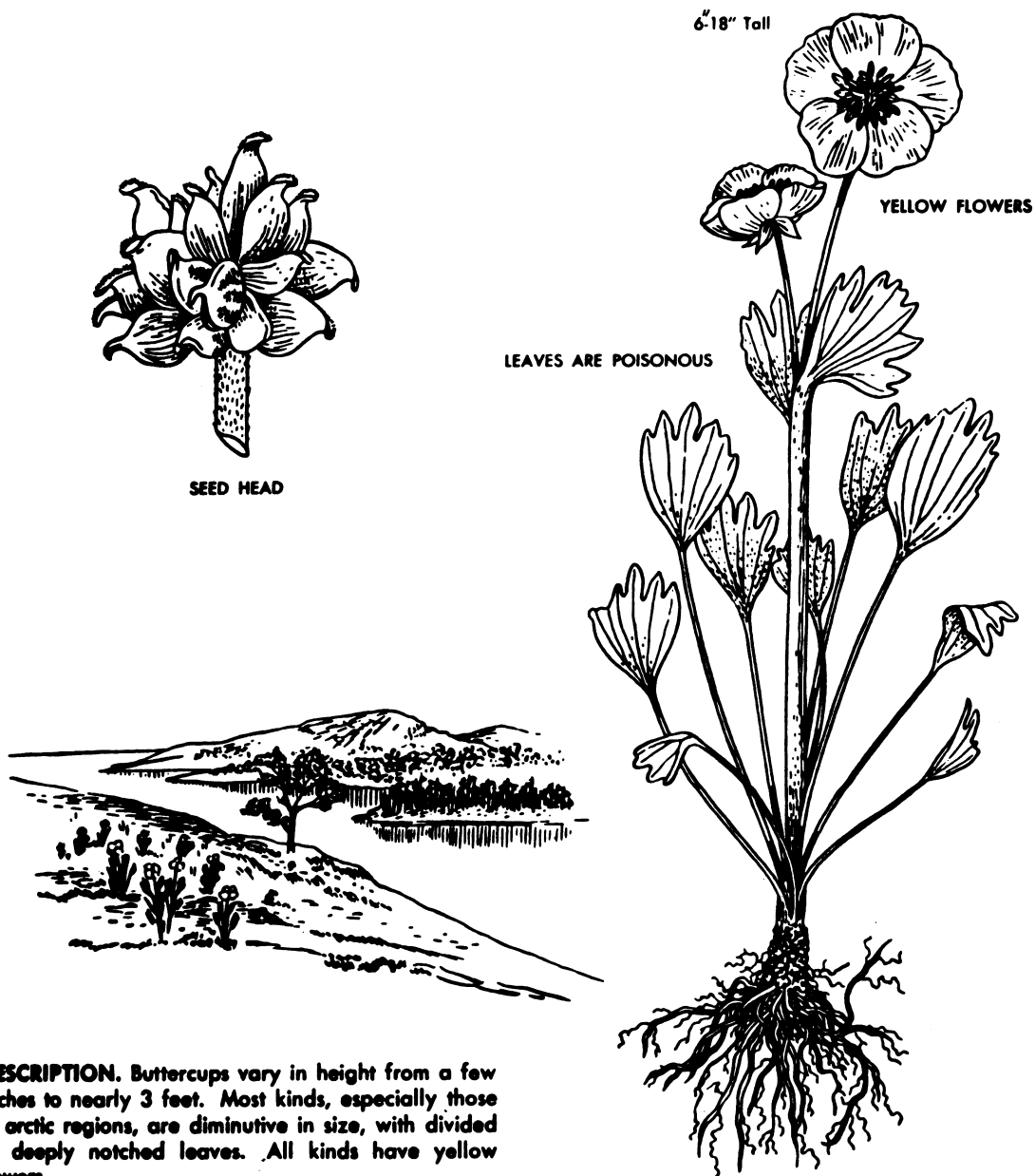
DESCRIPTION. Perennial from thick rootstalk. Stems smooth or somewhat hairy, 2 to 3½ feet high. Leaves large, divided into three leaflets. Leaflets thin, usually lobed and coursetoothed. Flowers small, white, many in a spikelike cluster at the top of the stem, each flower with 4-10 small, white petals. The fruit is a round, multiseed berry, red or white. Each berry is attached to the stem by a short, thick stalk, the white-berried plant having red stalks.

WHERE FOUND. Woods and thickets. This is a typical plant of the North Temperate Zone, especially from about latitude 40° N. to the arctic and sub-arctic areas of Europe, Asia, and North America.

CONDITIONS OF POISONING. The BERRIES of this plant are poisonous. As few as six berries can cause increased pulse, dizziness, burning in the stomach, and colicky pains. The ROOTSTALK is a violent purgative and emetic.

Figure 2. Baneberry.

(2) Buttercup:



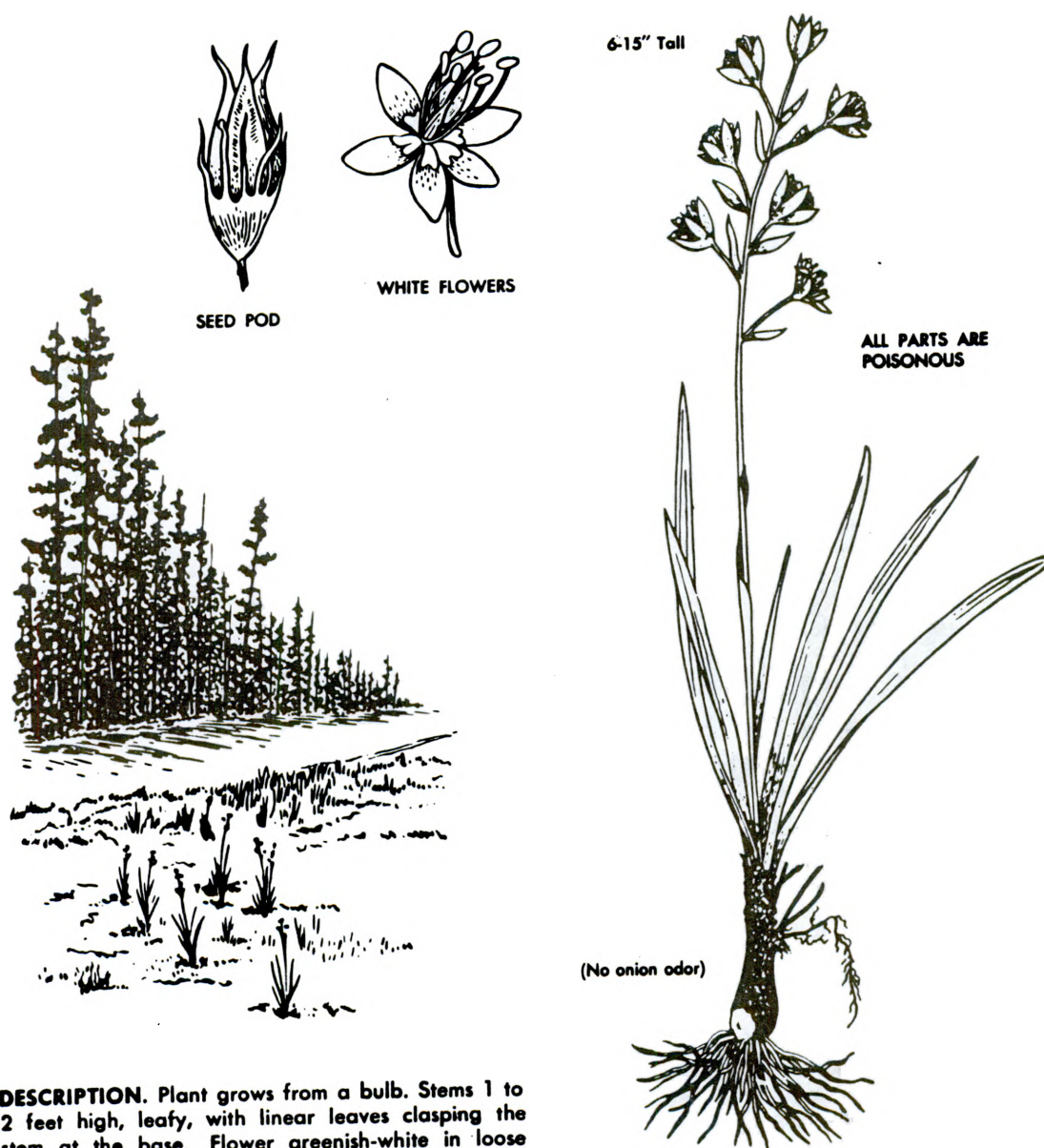
DESCRIPTION. Buttercups vary in height from a few inches to nearly 3 feet. Most kinds, especially those in arctic regions, are diminutive in size, with divided or deeply notched leaves. All kinds have yellow flowers.

WHERE FOUND. Widely distributed throughout the North Temperate Zone and well into the tundra of Europe, Asia, and America.

CONDITIONS OF POISONING. If the LEAVES are eaten, severe inflammation of the intestinal tract may result.

Figure 3. Buttercup.

(3) Death camas:



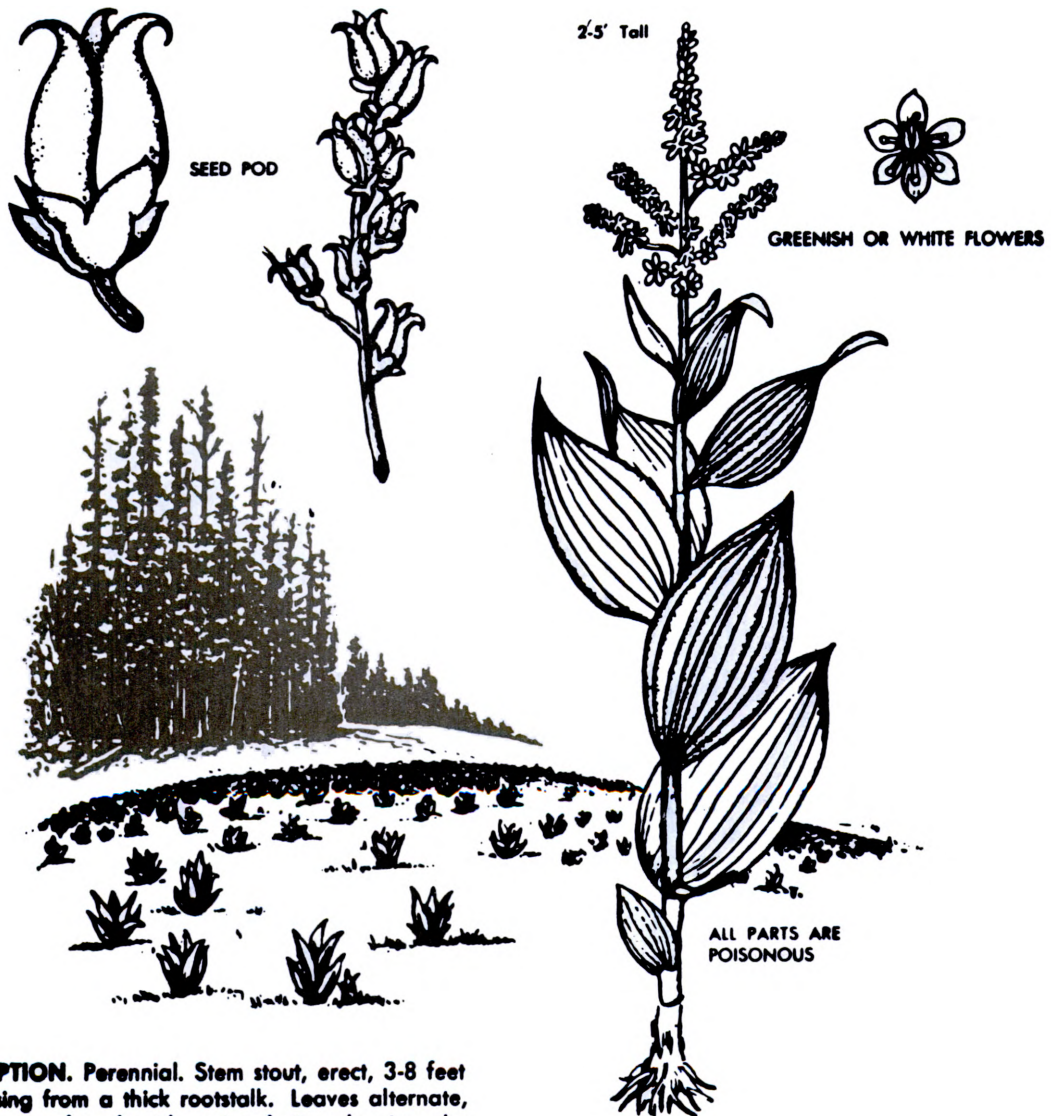
DESCRIPTION. Plant grows from a bulb. Stems 1 to 2 feet high, leafy, with linear leaves clasping the stem at the base. Flower greenish-white in loose terminal clusters—contrasted with wild onion, which has flowers closely aggregated at the top of the stem; also **NO ONION ODOR IN DEATH CAMAS.**

WHERE FOUND. The death camas occurs in meadows and on edges of forests in parts of western subarctic North America and eastern Siberia; also occurs farther south to western United States.

CONDITIONS OF POISONING. The death camas contains the toxic alkaloid, zygadenine, in **ALL PARTS OF THE PLANT FROM THE BULB TO THE SEED.** Children have been known to be poisoned by eating the bulbs, probably mistaking them for onions.

Figure 4. Death camas.

(4) False hellebore:



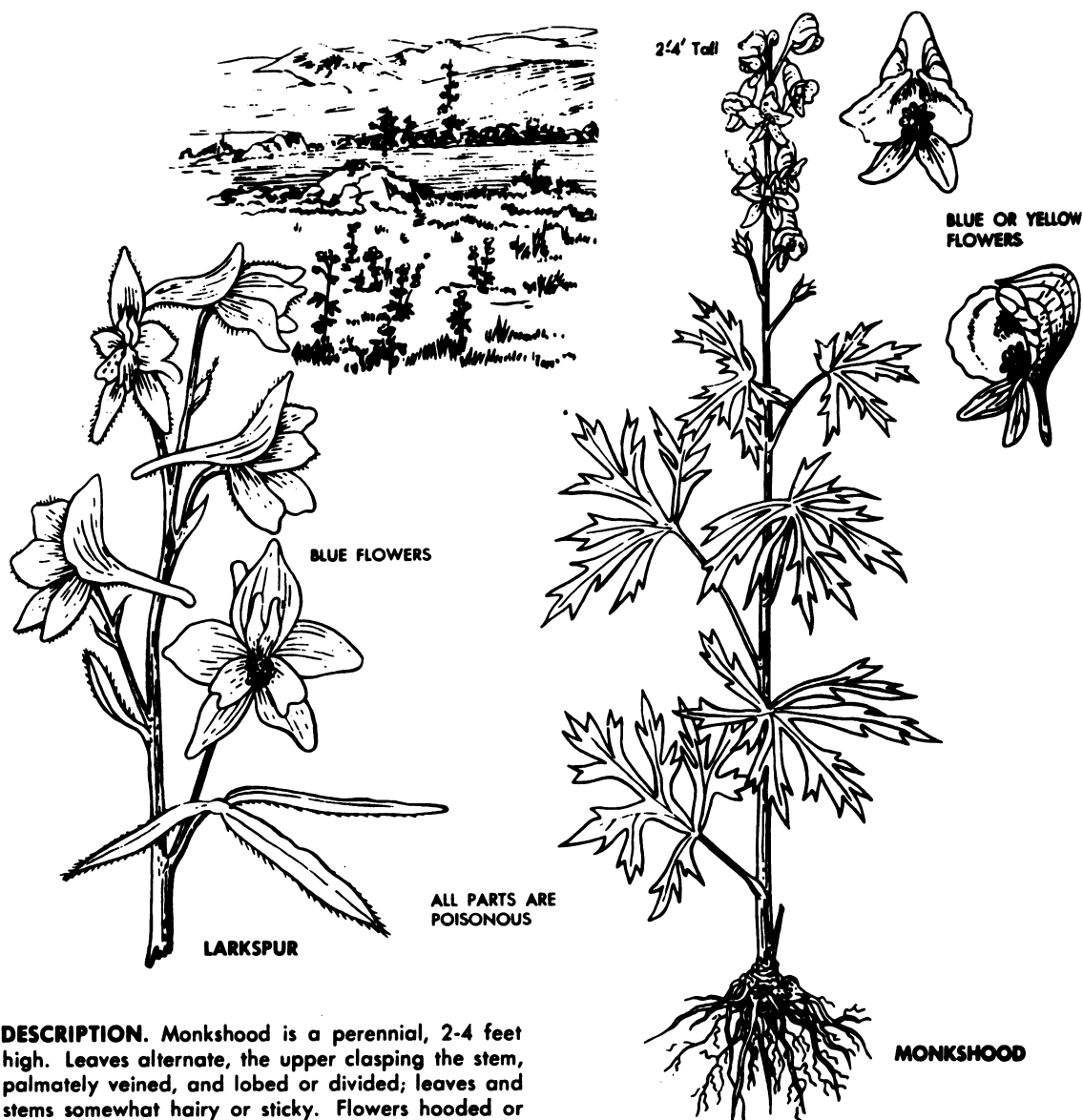
DESCRIPTION. Perennial. Stem stout, erect, 3-8 feet high, rising from a thick rootstock. Leaves alternate, broadly round-oval with pointed tip, clasping the stem; blade smooth above, hairy beneath; veins parallel. Small flowers in large terminal spikelike clusters with drooping branches; three petals, often greenish, but sometimes white.

WHERE FOUND. Swamps and low grounds in Europe, Asia, and America from about 40° N. latitude. Occurs on the edge of the arctic, although probably rare on the tundra.

CONDITIONS OF POISONING. Fatalities among humans from EATING FALSE HELLEBORE are rare but are more common to sheep and other animals. Symptoms are salivation, vomiting, purging, abdominal pain, muscular weakness, general paralysis, tremors, spasms, and occasionally convulsions. Death results from asphyxia.

Figure 5. False hellebore.

(5) Larkspur (delphinium) and monkshood:



DESCRIPTION. Monkshood is a perennial, 2-4 feet high. Leaves alternate, the upper clasping the stem, palmately veined, and lobed or divided; leaves and stems somewhat hairy or sticky. Flowers hooded or helmet-shaped, usually blue.

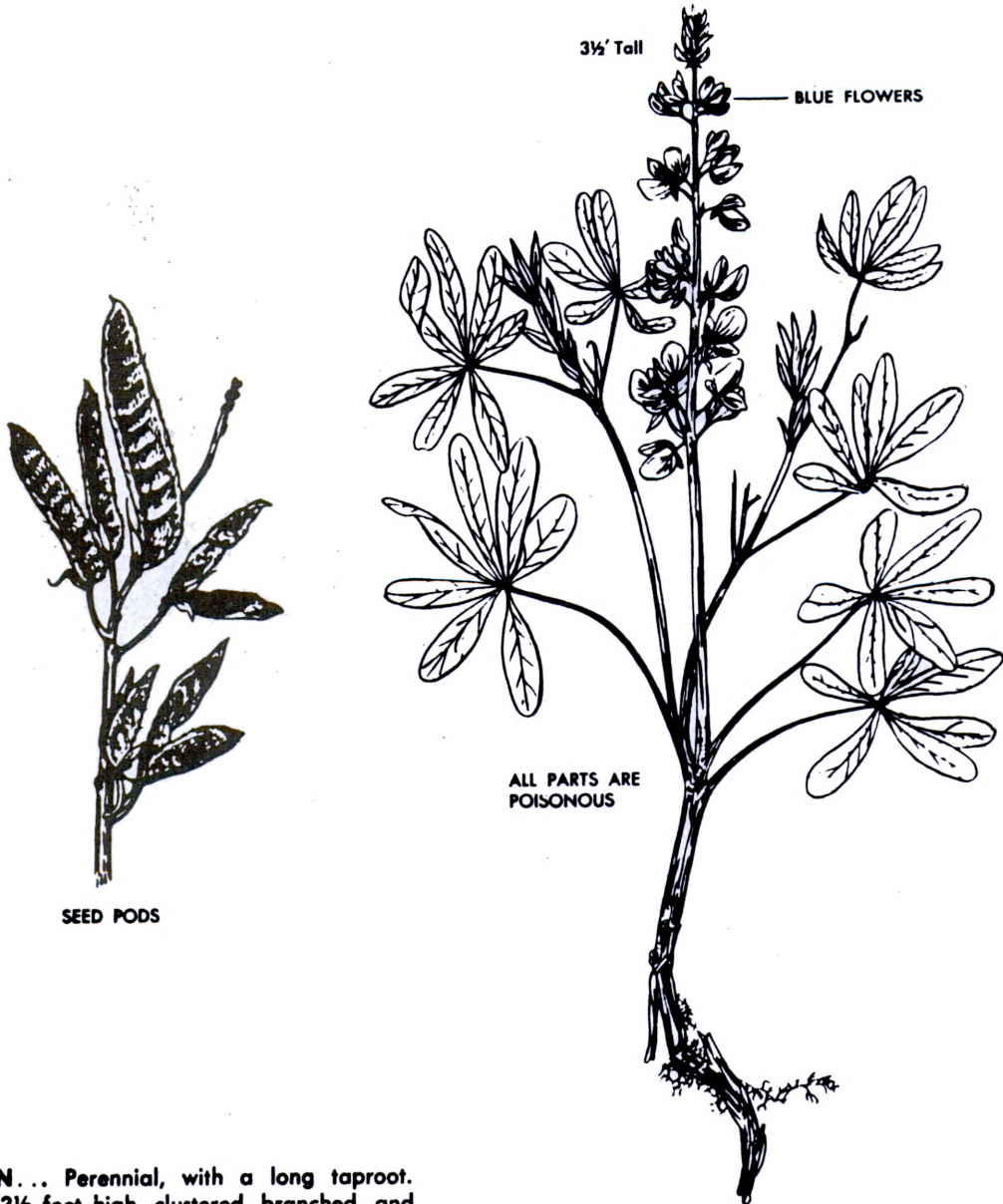
Larkspur is similar to monkshood, but the flowers are not hooded. Most kinds develop two spurs at the base of the flower.

WHERE FOUND. Monkshood and larkspur are distributed widely over the North Temperate and subarctic zones, especially in mountainous regions.

CONDITIONS OF POISONING. THESE PLANTS while poisonous at all times, seem to be most poisonous just before flowering. Symptoms are muscular weakness, irregular and labored breathing, weak pulse, bloating, belching, constant attempt at swallowing, and pupils contracted or dilated.

Figure 6. Larkspur and monkshood.

(6) Lupine:



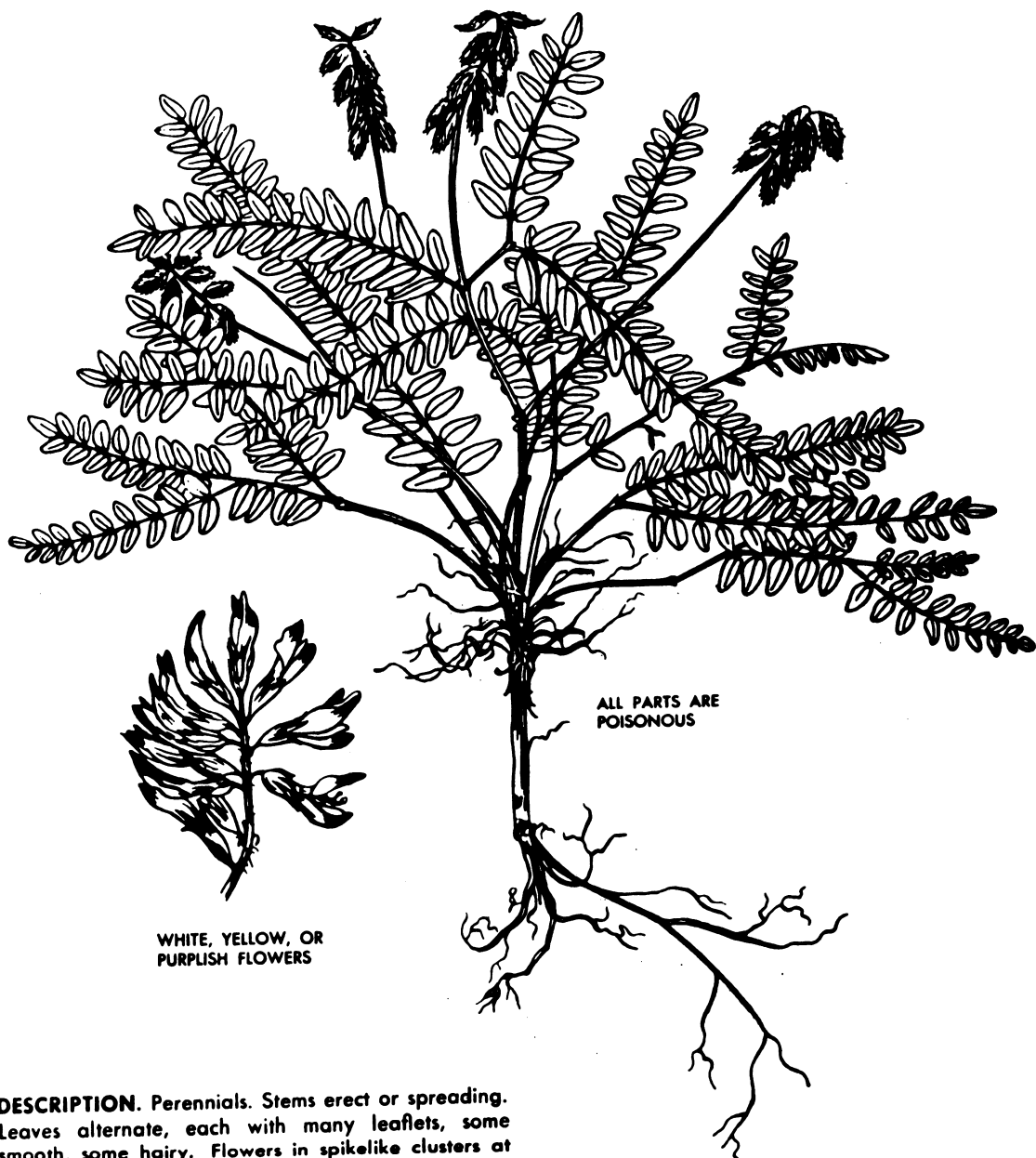
DESCRIPTION. . . Perennial, with a long taproot. Stems up to 3½ feet high, clustered, branched, and smooth to densely hairy. Leaves alternate, basal leaves on short stalks, palmately (like a hand) divided with 6-8 leaflets. Flowers blue, often shaded pink or white, rarely pure white.

WHERE FOUND. Found only on the North American Continent. Only one kind occurs in the arctic regions of Alaska.

CONDITIONS OF POISONING. Lupine plants contain alkaloids and are known to cause fatal poisoning in animals. When eaten in excess by humans, it produces serious effects. It is thought that the excess **WOODY FIBER** produces fatal inflammation of the stomach and intestines.

Figure 7. Lupine.

(7) Vetch and locoweed:



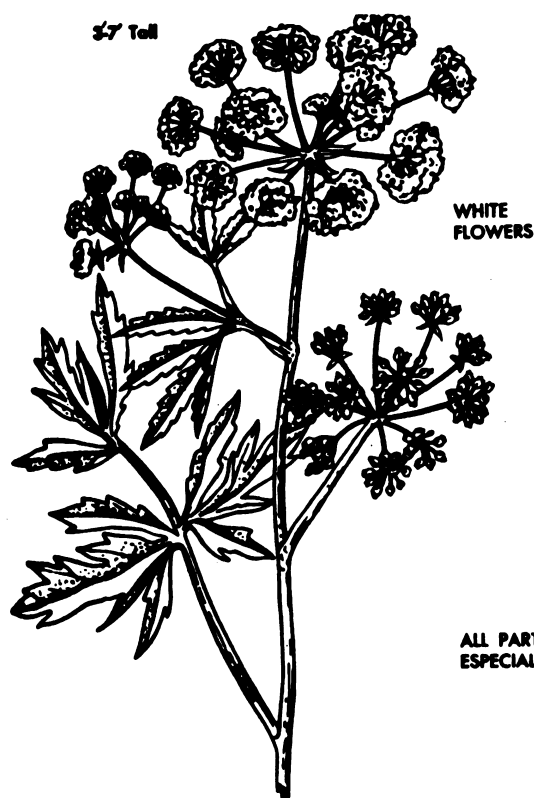
DESCRIPTION. Perennials. Stems erect or spreading. Leaves alternate, each with many leaflets, some smooth, some hairy. Flowers in spikelike clusters at top of stem. Individual flowers pealike in structure with five petals, white, yellow, or purplish.

WHERE FOUND. These plants occur rather abundantly in meadows, on hillsides, and on tundra throughout the North Temperate Zone.

CONDITIONS OF POISONING. Several species of locoweed have been reported as toxic. Avoid **ALL KINDS** to be on the safe side.

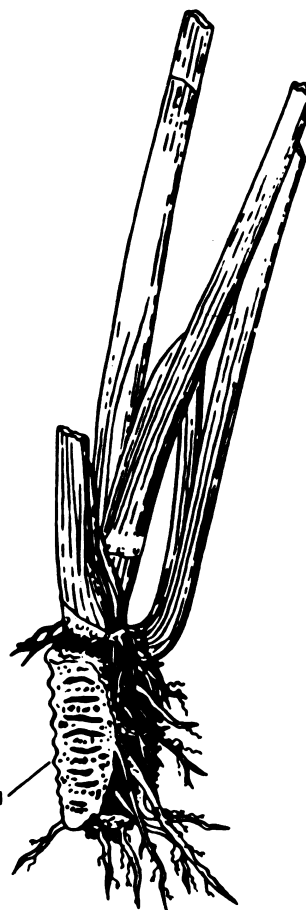
Figure 8. Vetch and locoweed.

(8) Poison water hemlock:



ALL PARTS ARE POISONOUS,
ESPECIALLY THE ROOTSTALK

ROOTSTALK WITH
AIR CHAMBERS



DESCRIPTION. Perennial. Stems $3\frac{1}{2}$ to 7 feet high, stout, jointed hollow between the joints, reddish. Leaves alternate, divided into narrow leaflets with toothed edges, and the leaf veins end at or near the tooth notches. Leafstalks sheath the stem. Rootstalk short, ringed on the outer surface and often, especially when young, has many fibrous rootlets; when older, it has many spindle-shaped roots bunched at the base. When root and lower stem are split lengthwise, many cross-partitions or chambers can be easily noticed. Plant exudes drops of a yellow aromatic oil which gives it a characteristic odor. Flowers small and white, in umbrellalike clusters at the top of the stalk.

WHERE FOUND. Wet meadows, ditches, along streams, and around tundra lakes. This plant belongs to the parsley, carrot, and parsnip family, which contains many well-known edible plants, but it is better to avoid all members of this family as food in northern areas, since the related waterhemlock is fairly common in the North Temperate Zone.



CONDITIONS OF POISONING. A piece of water-hemlock root about the size of a walnut is said to be sufficient to kill a cow. This plant contains a sticky, resinlike substance called circutoxin. This substance is most concentrated in the **ROOTS** but is present in **ALL PARTS** of the plant. Symptoms of poisoning are stomach pains, nausea, vomiting, weak and rapid pulse, and violent convulsions.

TREATMENT. In cases of hemlock plant poisoning, make the patient vomit, then give a cathartic. If vomiting is produced promptly, the victim is likely to recover.

Figure 9. Water hemlock.

2. Plants with stinging hairs generally do not constitute a real danger. Their sting, however, is painful. In the North Temperate Zone, nettles are the most common kind. In the tropics, the tree nettle and the cowhage can irritate. Recovery from the effects of these plants occurs in a relatively short time.

REFERENCES:

AF Manual 64-3, Survival, Aug 69 (attachment 1, pages A1-1 through A1-9)

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 2-22)

FM 31-11C-S

331-919-0006

CONSTRUCT A SIMPLE DRAG NOOSE

CONDITIONS:

You will be given a survival knife, a suspension line or similar material, and materials found in the area.

This will be done in a field setting containing small game and game trails.

STANDARDS:

Select a site where small game are likely to come.

Construct a simple drag noose which is large enough to capture a small animal and which will tighten when pressure is applied.

PERFORMANCE MEASURES:

1. Select the Site for the Snare.

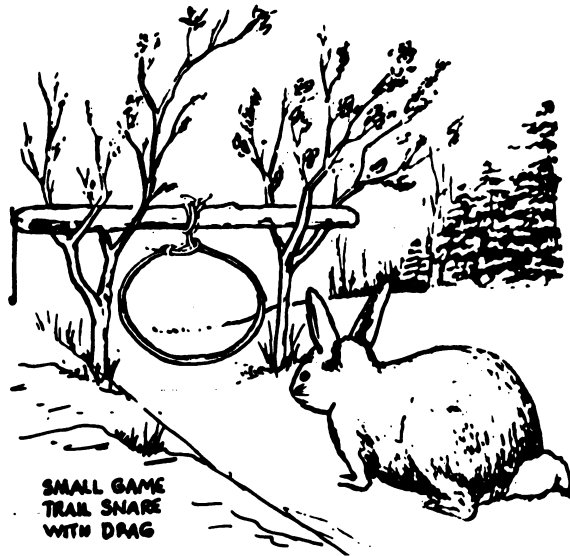
- a. Rats, mice, rabbits, and squirrels have regular habits and confine themselves to limited areas of activity. Therefore, a runway containing fresh tracks or droppings is a good location.

- b. Find a spot along the runway where bushes or brush will snag and hold the snare.

2. Construct the Snare.

- a. Tie a noose that will either slip or tighten up.

- b. Tie this noose to a drag stick that will catch in brush so that the animal's weight and speed will draw the noose about its neck, strangling it.



3. Erect Barriers on Either Side of the Runway Leading Into the Snare. Barriers should be made of dead branches, sticks, and dry leaves. Barriers should form a large V.

4. Eliminate the Human Scent. This can be done by:

a. Spreading animal blood or bladder contents around the area.

or

b. Building a fire and smoking the area.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-10c)

331-919-0007

CONSTRUCT A HANGING SNARE

CONDITIONS:

You will be given a survival knife, suspension line or similar material, and materials found in the area.

This will be done in a field setting containing small game and game trails.

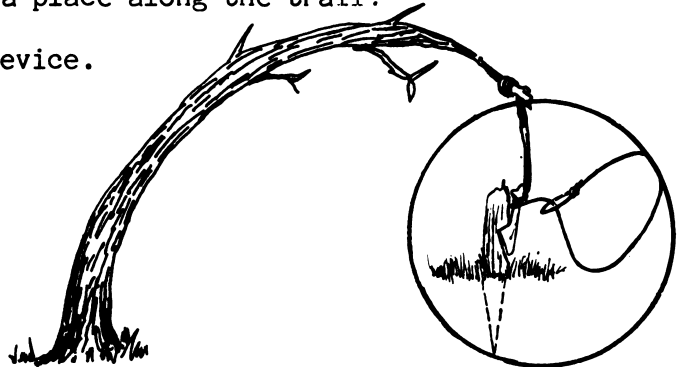
STANDARDS:

Select a site where small game are likely to come frequently.

Construct a hanging snare that will capture and hold a small animal.

PERFORMANCE MEASURES:

1. Locate a game trail in which to place the snare.
2. Find a sapling at a place along the trail.
3. Cut a triggering device.

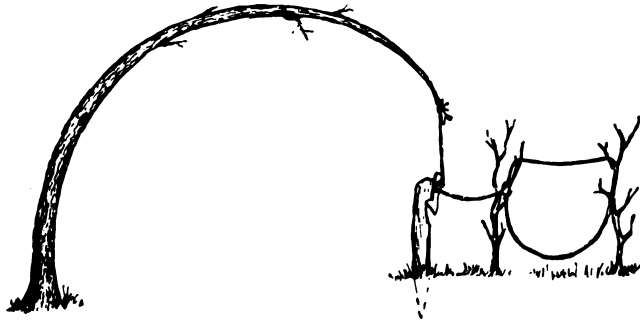


4. Place the triggering device securely in the ground so that the sapling, when bent, can be attached to the hook of the device.

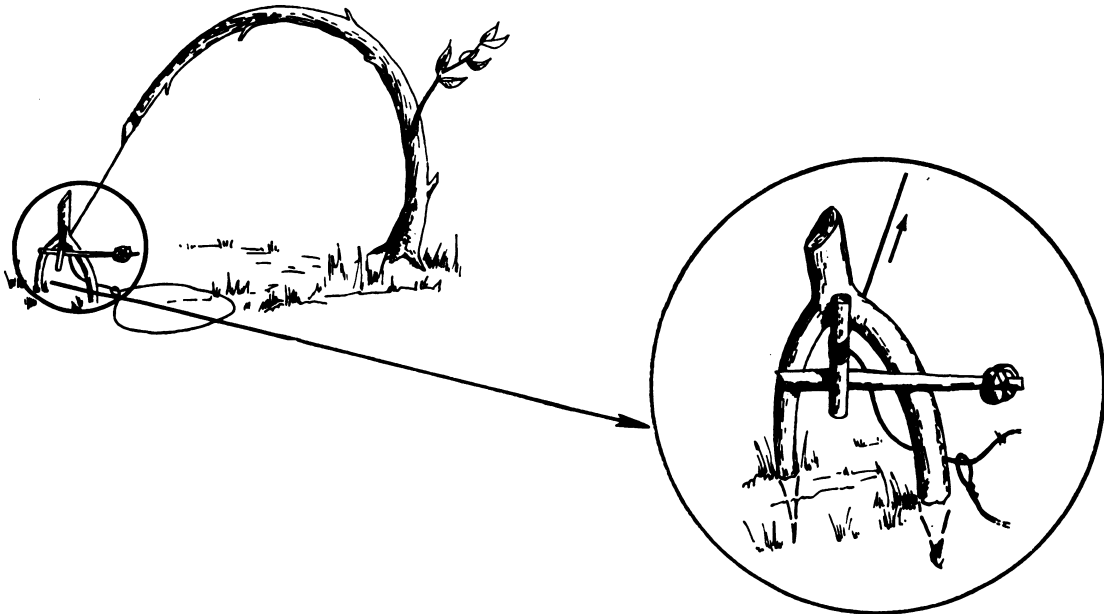
5. Make a slip noose wide enough to fit over the head of the game you are planning to snare.

6. Fasten the slip noose to the end of the bent sapling and to the triggering device.

7. Make sure the trigger holds the sapling.



8. If no game trail can be found and bait is available, rig a snare as shown below.



REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-10c)

331-919-0008

CONSTRUCT A FIXED SNARE

CONDITIONS:

You will be given a survival knife, suspension line or similar material, and materials found in the area.

This will be done in a field setting containing small game and game trails.

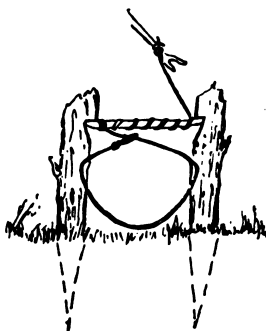
STANDARDS:

Select a site where small game are likely to come.

Construct a fixed snare that will capture and hold a small animal.

PERFORMANCE MEASURES:

1. Locate a game trail in which to place the snare.
2. Select appropriate materials to make a triggering device like the one shown below.
3. Cut a piece of suspension line (or similar material) to a length that allows for making a slip noose large enough to catch the intended game and for attaching the noose to a bush or limb.
4. Attach the noose to the triggering device.



REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-10c)

331-919-0009

CONSTRUCT A DEADFALL

CONDITIONS:

You will be given a survival knife, suspension line or similar material, and materials found in the area.

This will be done in a field setting containing medium to large game and game trails.

STANDARDS:

Select a site where large animals are likely to come.

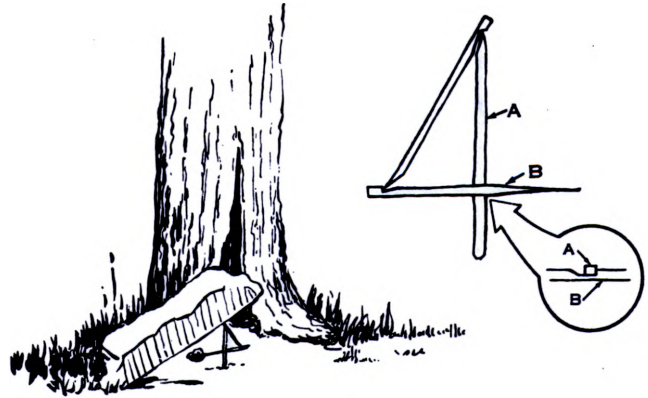
Construct a deadfall using a figure four trigger that will spring when tripped. Deadfall must be capable of catching a medium to large animal.

PERFORMANCE MEASURES:

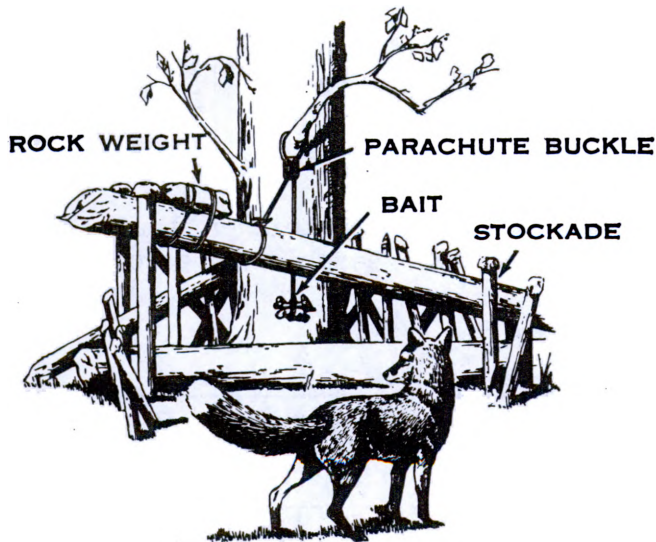
NOTE: This type trap is recommended only for areas where the number of game present justifies the time and effort spent in construction.

1. Build your deadfall close to or across a game trail beside a stream or on a ridge.

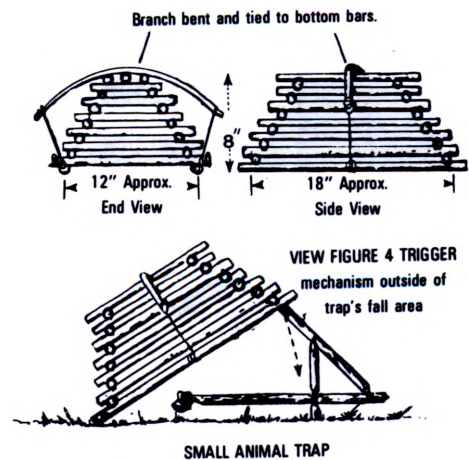
2. Construct the deadfall as shown on the following page. Be sure the fall log slides smoothly between the upright guideposts, and that you place the bait far enough from the bottom log to insure time for the fall log to drop before the animal can withdraw its head.



A simple deadfall using a figure 4 trigger.



A fall log trap for big game.



REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-10c(8))

MAKE A FISHHOOK

CONDITIONS:

You will be given a suspension line or similar material, survival knife, necessary materials (bone, pin, nail, or similar item).

STANDARDS:

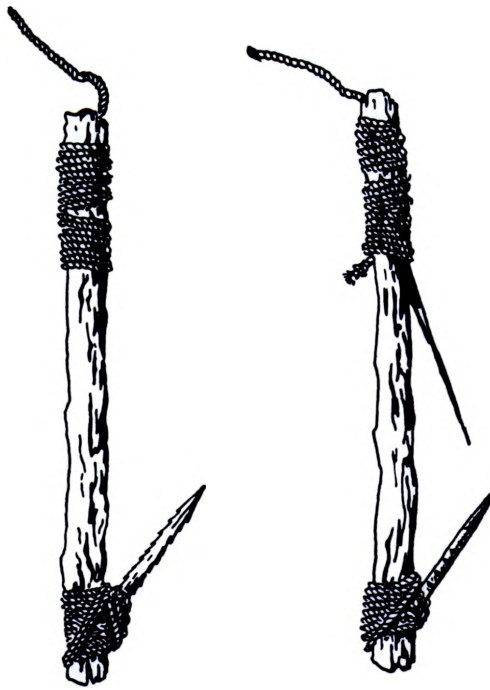
Make a fishhook that will hook and hold a fish.

PERFORMANCE MEASURES:

1. For the shank of the hook, cut a piece of hardwood approximately 2 inches long and one-half inch in diameter. Cut a notch near the end to hold the point (bone, pin, nail, or similar item).
2. Place the point (pin, bone, nail, or similar item) in the notch at the end of the 2-inch piece of hardwood.
3. Hold and tie the point flush against the hardwood shank.

NOTE: If suspension line or similar material is not available, a sturdy line can be made by twisting bark or cloth fibers. Using the inner bark of a tree, knot the ends of two strands and secure them to a solid base. Hold a strand in each hand and twist clockwise. Add fiber as necessary to increase the length of line.

- a. With the suspension line, make a clove hitch and take approximately six turns around the end of the point and the hardwood shank, making sure you hold them firmly together.
- b. Take two or three frapping turns between the pin and the hardwood shank to spread and hold the pin firmly angled to the shank.
- c. Take two more turns around the shank and tie with a clove hitch.



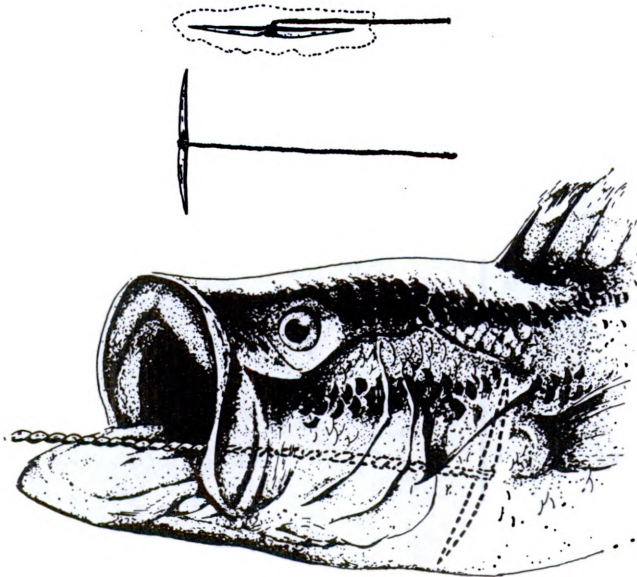
BONE

NAIL

Improvised hooks and lines.

4. An excellent hook for a set line is the gorge or skewer hook. Sink the skewer into a chunk of bait. After the fish swallows the bait, the skewer swings crosswise and lodges in the stomach, securing the fish to the line.

BAITED SKEWER



Skewer hook.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-7 and 8-3)

FM 31-11C-S

331-919-0011

START A FIRE WITHOUT A MATCH

CONDITIONS:

You will be given a lensatic compass, magnifying glass, starter material (should be available in the area), survival knife, and suspension line or similar material.

This will be done in a field setting.

STANDARDS:

Prepare the starter material.

Start a fire without using a match or lighter.

PERFORMANCE MEASURES:

1. Prepare some dry tinder. Some excellent tinders are punk, lint from cloth, rope or twine, dead palm frond, finely shredded dry bark, dry powdered wood, bird nest, wooly material from plants, and wood dust caused by insects and often found under dead trees.

2. Shelter this tinder from the wind and dampness.

3. Start fire using:

a. Sun and glass. A camera lens, a convex lens from binoculars, lens from a telescopic sight or flashlight, or a magnifying glass from a compass may be used to concentrate the rays of the sun on the tinder.

b. Flint and steel.

(1) Fasten the flint to the bottom of a waterproof match case. A hard piece of stone will serve as a substitute.

(2) Hold the flint as near the tinder as possible and strike the flint with a knife blade or other small piece of steel. Strike downward so that the sparks will hit in the center of the tinder.

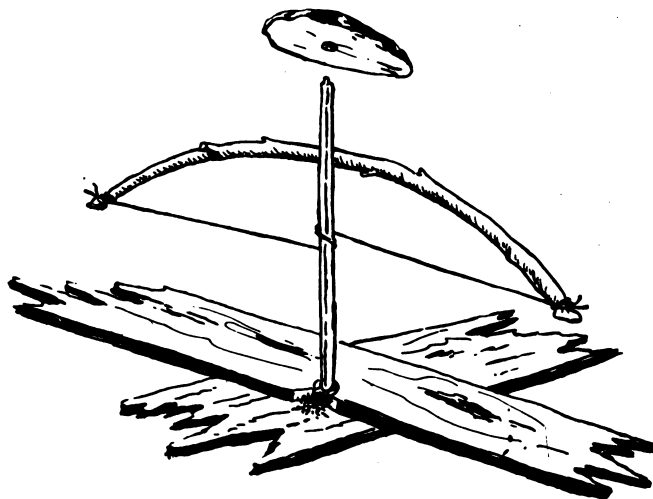
(3) When the tinder begins to smolder, fan or blow it gently into a flame.



Flint and steel.

c. Wood friction. This is a difficult method of starting a fire and ordinarily would only be used as a last resort.

(1) Bow and drill. Make a strong bow strung loosely with a shoelace, string, or thong. Use it to spin a dry, soft shaft in a small block on bone-dry hardwood. This forms a black powdered dust which eventually catches a spark. When smoke begins to rise, there should be enough spark to start a fire. Lift the block and add tinder.



Bow and drill.

(2) Fire thong. Use a strip of dry rattan for a thong, preferably about one-fourth inch in diameter and about 2 feet long, and a dry stick. Split one end of the stick and hold it open with a small wedge. Place a small wad of tinder in the split, leaving enough room to insert the thong behind it. Elevate the split end of the stick off the ground. Secure the stick in place so that you can work the thong back and forth.



Fire thong.

(3) Fire saw. Use two pieces of wood and saw them vigorously against each other.

d. Ammunition and powder. In a sheltered area, prepare a pile of kindling and wood. Place the powder from several cartridges at the base of the pile. Take two rocks and sprinkle a little powder on one rock. Then, grind the two rocks together immediately above the powder at the base of the pile. This will ignite the powder on the rock and, in turn, the larger amount of powder and kindling wood.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 4-3)

FM 31-11C-S

331-919-0012

DEVISE A MEANS FOR COOKING

CONDITIONS:

In a field setting, you will be given food to cook, materials found in the area, survival knife, suspension line or similar material, and poncho or parachute material.

STANDARDS:

Select a suitable site for a cooking fire.

Devise a means for cooking.

PERFORMANCE MEASURES:

1. In selecting a suitable site for a cooking fire, you must consider the type of terrain, weather conditions, type of food to be cooked, and security.

a. Locate the fire carefully to avoid setting a grass or forest fire. If the fire must be built on wet ground or snow, first build a platform of logs or stones. In rainy weather, a lean-to (see task number 331-919-0002) or a parateepie made from a parachute can be used as protection.

b. Food may be prepared by boiling, roasting or broiling, baking, steaming, or parching.

(1) Boiling is probably the best method of cooking because it conserves the natural juices of the food. Meats of all types and plant food can be boiled.

(2) Roasting or broiling is a quick way to prepare wild plant food and tender meat.

(3) Baking is cooking in an oven over steady, moderate heat. The oven may be a pit under the fire, a closed vessel, or a leaf or clay wrapping. Foods especially suitable for baking are roots and tubers; tough, heavy-skinned fruit; mollusks; and bread.

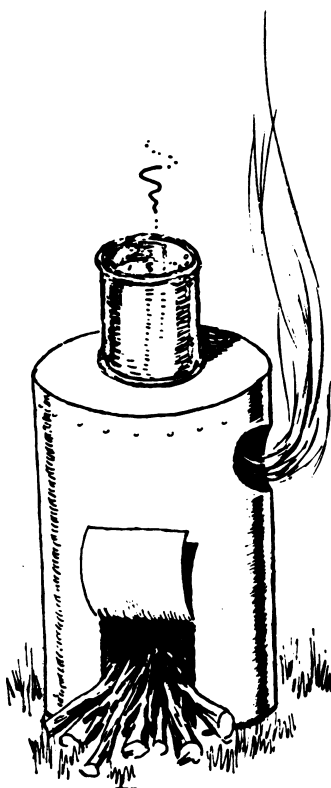
(4) Steaming can be done without a container and is suitable for foods that require little cooking, like the shellfish.

(5) Parching may be used to prepare such foods as grains and nuts.

c. If security is a factor, an underground fireplace (described below) may be used.

2. Some type of stove with a small fire is best for cooking. However, following are some other means that may be used:

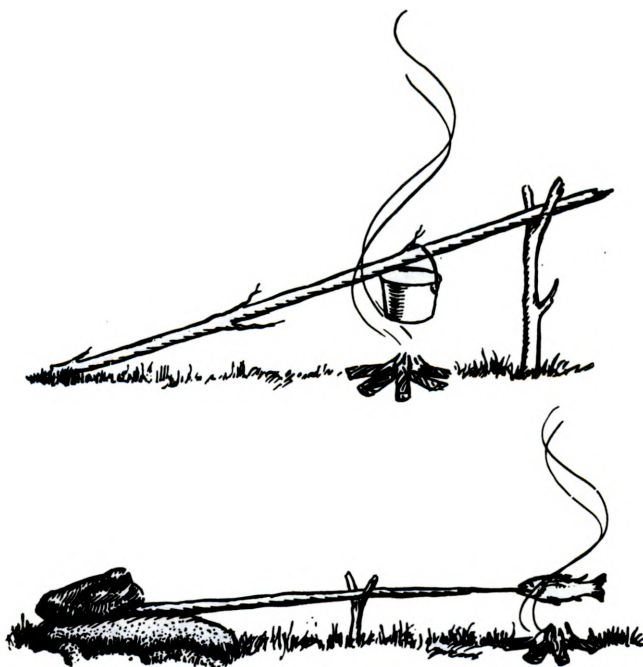
a. A hobo stove made out of a tin can conserves fuel.



Hobo stove.

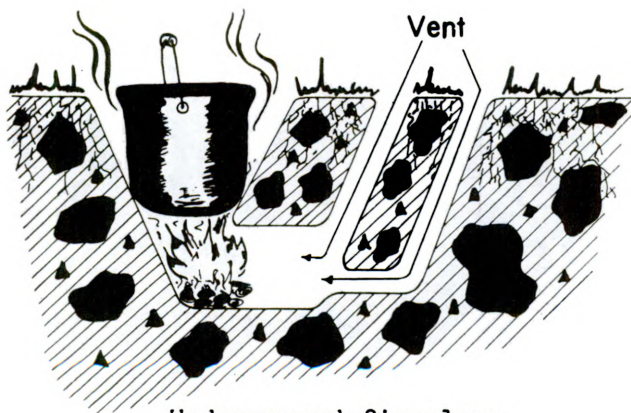
b. A simple fireplace can be made by using two logs, stones, or a narrow trench on which to support a vessel over the fire.

c. A simple crane propped over a forked stick will hold a cooking container over a fire.



Simple crane.

d. An underground fireplace has a distinct advantage in a survival situation where security is essential since it will substantially reduce the smoke and flame. One or more vents on the upwind side provide an in-built draft for the fire burning under a cooking utensil.



Underground fireplace.

3. A bed of hot coals provides the best cooking heat. Place the firewood crisscross and allow it to burn down to a uniform bed of coals.

4. A fire that is to be used for baking should be built in a pit and allowed to burn into a bed of coals.

FM 31-11C-S

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (chap 4)

MAKE A WATER STILL

CONDITIONS:

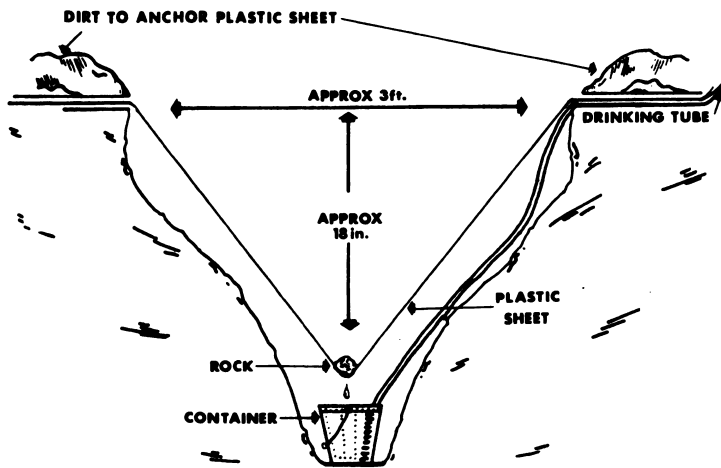
In a field setting, you will be given a poncho or sheet of plastic material 48" x 48", entrenching tool, flexible tubing, canteen cup or similar item, and materials found in the area.

STANDARDS:

Construct a still that will produce water.

PERFORMANCE MEASURES:

1. Dig a pit 3 feet in diameter and 18 inches deep.
2. Put a shallow container in the center of the pit. Extend the flexible tubing from the container to the edge of the pit (this will allow you to drink water without removing the container from the pit).
3. Spread the clear plastic (or poncho) over the pit, allowing it to sag downward over the container. Anchor the plastic in place.
4. Place a rock in the center of the plastic to form a cone directly over the container.
5. Do not expect to have drinking water immediately. The least you should have in 24 hours is a pint.



CROSS SECTION OF SURVIVAL STILL. HEAT FROM SUN VAPORIZES GROUND WATER. THEN THIS VAPOR CONDENSES UNDER PLASTIC, TRICKLES DOWN, DROPS INTO CONTAINER.

Water "still."

NOTE: The still may also become a source of food. The water bucket under the plastic attracts snakes and small animals which crawl down the top surface of the plastic and then cannot climb out.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-19)

331-919-0014

OBTAIN WATER FROM PLANTS

CONDITIONS:

You will be given a survival knife, suspension line, a container, and gloves.

This will be done in a field setting in which plants that can be used for water are growing.

STANDARDS:

Select the plants from which water may be obtained.

Obtain water.

PERFORMANCE MEASURES:

1. Sap. The clear, sweet sap from many plants is easily obtained. It is pure and chiefly water.

2. Plant Tissues.

a. Many plants with fleshy leaves or stems store drinkable water. Try them wherever you find them. (See task number 331-919-0005 for plants to avoid.)

b. The barrel cactus found in southwestern United States is a possible source of water. It has a tough, outer, spine-studded rind which is difficult to cut through. Cut off the top of the cactus and smash the pulp within the plant. Catch the liquid in a container. Chunks may be carried as an emergency water source.



Water from a barrel cactus.

3. Roots of Desert Plants. Desert plants often have their roots near the surface. The Australian "water tree," desert oak, and bloodwood are examples. Pry the roots out of the ground; cut them into 24- to 36-inch lengths. Remove the bark and suck the water from the root.

4. Vines. Not all vines yield palatable water, but try any vine found. Use the following method for tapping a vine.

a. Cut a deep notch in the vine as high up as you can reach.

b. Cut the vine off closely to the ground. Water will begin to drip from the severed end. Let the water drip into your mouth or a container.

c. When the water ceases to drip, cut another piece off the vine. Repeat this until the supply is gone.

5. Palms. Buri, coconut, sugar, and nipa palms contain a drinkable, sugary fluid. To start the fluid of the coconut palm flowing, bend the flower stalk downward and cut off tip. If a thin slice is cut off every 12 hours, you can renew the flow and collect approximately a quart a day.

6. Coconut.

a. Select green coconuts; they have more milk than ripe coconuts and can be opened easily with a knife. Coconut milk is a strong laxative so do not drink more than necessary to quench your thirst (no more than 3 or 4 cups a day).

b. To open a coconut without a knife, find a sharp object such as a rock or a protruding stump. Bring the nut down on the point of the rock or stump with sufficient force to break off the outer fibrous covering. The milk can be obtained by piercing two eyes of the coconut with a sharp object such as a stick or a nail.

7. Plants That Catch and Hold Water.

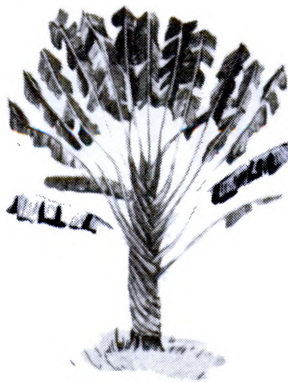
a. Bamboo stems often have water in the hollow joints. Shake the stems of old, yellowish bamboo. If a gurgling sound is heard, cut a notch at the base of each joint and catch the water in a container.

b. In the American tropics, the overlapping, thickly growing leaves of the pineapple-like bromeliads may hold rainwater. Strain the water through cloth to remove most of the dirt and water insects.



Bromeliad catches water.

c. Other water-yielding plants include the traveler's tree of Madagascar, the umbrella tree of western tropical Africa, and the baobab tree of northern Australia and Africa.



Traveler's tree.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-17 and 3-18)

PURIFY MUDDY AND STAGNANT WATER

CONDITIONS:

You will be given muddy or stagnant water, a container, and materials found in the area.

This will be done in a field setting.

STANDARDS:

Purify water.

PERFORMANCE MEASURES:

If you have exhausted all other sources of water, you may drink water from a muddy or stagnant pool even though it has an odor.

a. To clear muddy water, use one of the following methods:

(1) Let it stand 12 hours.

(2) Pass it through about 3 feet of bamboo that is filled with sand. Stuff grass in one end to contain the sand.

(3) Pour it through sand-filled cloth.

b. To purify the water, boil it for at least 1 minute; add charcoal from the fire to remove the odors. Let the water stand for about 45 minutes before drinking it.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 3-12)

331-919-0016

DETERMINE DIRECTION BY MEANS OF A WATCH

CONDITIONS:

You will be given a watch.

This will be done in a field setting during daylight.

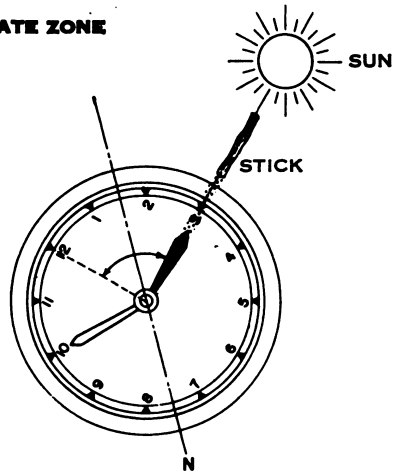
STANDARDS:

Find true north $\pm 5^\circ$.

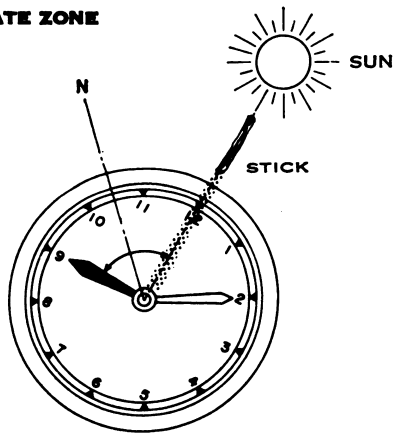
PERFORMANCE MEASURES:

1. North Temperate Zone.
 - a. Point the hour hand toward the sun.
 - b. Draw a north-south line midway between the hour hand and 12 o'clock.
 - c. If there is any doubt as to which end of the line is north, remember that the sun is in the eastern part of the sky before noon and in the western part in the afternoon.
2. South Temperate Zone.
 - a. Point 12 o'clock toward the sun.
 - b. Halfway between 12 o'clock and the hour hand will be the north-south line.
 - c. On cloudy days, place a stick at the center of the watch and hold it so the shadow of the stick falls along the hour hand.
 - d. One-half the distance between the shadow and 12 o'clock is north.

NORTH TEMPERATE ZONE



SOUTH TEMPERATE ZONE



Using a watch to find north.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 2-5)

331-919-0017

DETERMINE DIRECTION BY THE STARS

CONDITIONS:

You will be in a field setting during darkness with good visibility (able to see the stars).

STANDARDS:

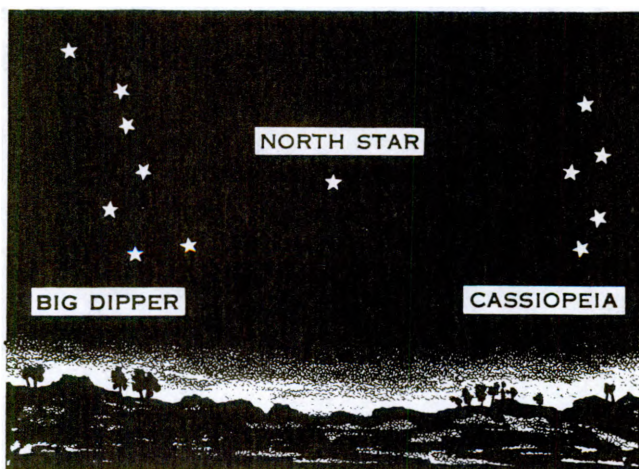
Find true north ± 50 by using the stars.

PERFORMANCE MEASURES:

1. Northern Temperate Zone.

a. Find the Big Dipper. The two stars at the end of the bowl of the Big Dipper are called the "pointers." In a straight line out from the "pointers" is the North Star (at about five times the points).

b. The constellation Cassiopeia can also be used. This group of five bright stars is shaped like a lopsided M (or W, when low in the sky). The North Star is straight out from the center star.

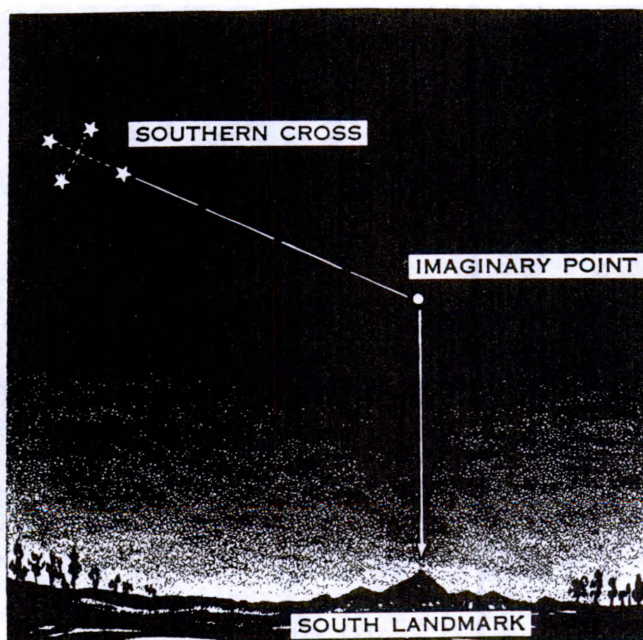


2. Southern Temperate Zone.

a. The constellation Southern Cross will help you locate the general direction of south.

b. This group of four bright stars is shaped like a cross tilted to one side. The two stars forming the long axis, or stem, of the cross are called the "pointers."

c. From the foot of the Cross, extend the axis to five times its length to an imaginary point. This point is the general direction of south.



REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 2-5)

331-919-0018

DETERMINE DIRECTION BY THE SHADOW TIP METHOD

CONDITIONS:

You will use the materials found in a field setting..

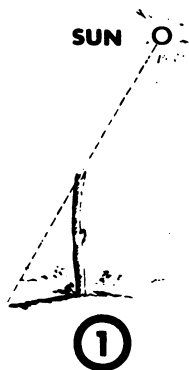
This will be done during daylight hours.

STANDARDS:

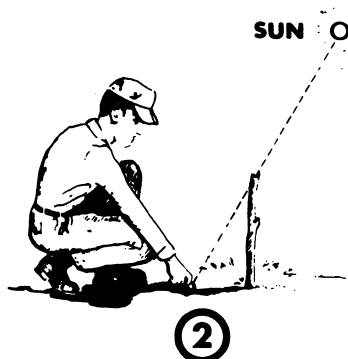
Find true north $\pm 5^\circ$.

PERFORMANCE MEASURES:

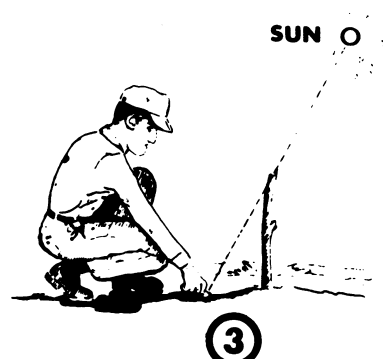
1. Find a fairly straight stick about 1 meter long.
2. Push the stick into the ground at a fairly level, brush-free spot where a distinct shadow will be cast.
3. Mark the shadow tip.
4. Wait until the shadow tip moves a few inches. Ten to fifteen minutes should be enough time to wait.
5. Mark the shadow tip.
6. Draw a straight line from the first mark to the second mark, extending the line 1 foot past the second mark.
7. Stand with the toe of the left foot at the first mark and the toe of the right foot at the end of the line you drew. You are now facing north.



Push the stick into the ground at a level spot so that it is straight up and down; notice that the stick casts a shadow.



Mark the tip of the shadow with a small rock and wait until the shadow moves a few inches; 10-15 minutes.



Mark the tip of the second shadow.



Draw a line from the first rock to the second rock and about a foot past the second rock.



Stand with the toe of your left foot at the first rock and the toe of your right foot at the end of the line you drew.



You are now facing north.

REFERENCE:

FM 21-76, Survival, Evasion, and Escape, Mar 69 (para 2-5)

874-896-3001

PREPARE AND CONDUCT A PERFORMANCE-ORIENTED
TRAINING SESSION (INDIVIDUAL AND COLLECTIVE)

CONDITIONS:

Given complete commander's guidance for preparation and conduct of a specific training session (individual or collective); an ARTEP applicable to your unit; Soldier's Manuals for the MOSSs of your subordinates; FM 21-6; and access to your unit's training aids and devices, TEC equipment, and training facilities/areas.

STANDARDS:

Within the time and resource limits given in the commander's guidance, conduct the training session so that each individual or element(s) can perform to the standards specified and under the conditions listed in the commander's training objective.

PERFORMANCE MEASURES:

1. Overview. The preparation and conduct of performance-oriented training (be it individual or collective, equipment or tactically oriented) consists of the three-step backward planning process:

- a. Describe the desired results of training.
- b. Prepare to conduct training.
 - (1) Establish intermediate training objectives.
 - (2) Determine and organize training required.
- c. Conduct training to standards.

A more detailed discussion of these three steps is outlined below.

2. Describe the Desired Results of Training. If you are given complete guidance by your commander, this step is done for you; if not, you will have to complete it so that it is satisfactory to your commander. To be complete, it must include the following:

a. WHAT SPECIFIC TRAINING OBJECTIVE DO YOU WANT ACCOMPLISHED? The training objective should include the task that the soldiers must be able to perform, the conditions under which the soldiers must perform the task, and the training standard which specifies the proficiency the soldiers must attain.

b. TO WHOM WILL THE TRAINING BE GIVEN? (e.g., two squads.)

c. WHEN WILL THE TRAINING TAKE PLACE? (e.g., 1300-1700 hours, 25 September, 3 weeks from now.)

d. WHERE WILL THE TRAINING TAKE PLACE? (e.g., Training Area K.)

e. WHY THE COMMANDER DECIDED TO CONDUCT THE TRAINING. What were his reasons for his decision?

3. Prepare To Conduct Training. This step is usually the most time consuming and difficult of the three steps. Do not take it lightly; however, if done properly it will insure the success of your training effort. It consists of the following:

PREPARE TO CONDUCT TRAINING

Establish Intermediate Training Objectives by:

Developing tasks required to accomplish the commander's training objective.

Establishing the conditions under which each task must be accomplished.

Establishing a training standard of performance for each task.

Determine and Organize Training Required by:

Determining which intermediate training

objectives the soldiers cannot successfully perform without further training.

Organizing the intermediate training objectives into a progressive sequence (simple to complex) consistent with the available resources.

Estimating the training resources, trainer techniques, aids and devices needed to accomplish each objective.

Completing administrative requirements (e.g., obtaining equipment, writing the lesson plan, rehearsing training, etc.).

There are several references and aids which can assist you in accomplishing this step.

a. FM 21-6, How to Prepare and Conduct Military Training, provides detailed discussion on the preparation and conduct of training.

b. The ARTEP for your unit lists training objectives for most of the collective tasks you will be concerned with.

c. Soldier's Manuals list training objectives and intermediate training objectives for individuals for most of the training (both individual and collective) you will encounter. In addition, they provide training tips which can assist you in your preparation.

d. Training Extension Course (TEC) lessons develop (or will in the future) most of your intermediate training objectives into prepackaged lessons. In some cases they are hands-on. In others, you must complete the training by providing the performance practice and evaluation. In addition, the pretest for each lesson can help you identify which intermediate training objectives require (or do not require) training.

4. Conduct Training to Standards. The basics of the conduct of training are presented in the task, Conduct a Performance-Oriented Training Session. In some cases, when collective training is involved, you will find the use of multiechelon training to be an efficient method of training. Despite the different name, the basics still apply. You might require assistant trainers (other squad leaders, for example), but the process of conducting training remains the same:

- a. Explain and demonstrate.
- b. Soldiers/teams/squad practice.
- c. Test.

Remember: the key to success is a good training objective.

REFERENCES:

FM 21-6, How to Prepare and Conduct Military Training, Nov 75 (chap 6, pages 51-70, 76)
TEC Lesson 901-071-0091-F, Unit Development and Training

FM 31-11C-S

MONITOR AND EVALUATE TRAINING

CONDITIONS:

As a senior NCO, given guidance to monitor and evaluate a specific training session (individual or collective); training schedule applicable to your unit; Soldier's Manuals for the MOSs of your subordinates; FM 21-6; parent unit Training Evaluation Report Form; status report; and lesson plan.

STANDARDS:

Within the time available, monitor and evaluate the training session and determine, as a minimum:

1. Whether complete performance-oriented training objectives have been developed.
2. Whether, as a result of the training, the soldiers undergoing training can perform the objective(s) and meet or exceed the established training standard(s).

PERFORMANCE MEASURES:

1. General. Monitoring and evaluation is a never-ending first and last step in the commander's/training manager's efforts to plan and conduct efficient and effective training. Proper conduct of these activities provides the commander/training manager with information and data he needs to prepare or revise his plans for future training. With respect to monitoring and evaluation of training, the commander/training manager is concerned with two issues: efficiency and effectiveness.

TRAINING EVALUATION REPORT

Unit _____ Date _____

Subject/Mission _____ Principal Trainer _____

Time Training Began _____ Soldiers Present for Training _____

Ended _____ Time Evaluator Arrived _____

Location _____ Departed _____

	YES	NO	N/A	Not Observed
1. Did the trainer have specific training objectives to accomplish (i.e., did all objectives (commander's and intermediate) specify the task(s) to be performed, the conditions of performance, and the training standard of acceptable performance)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
2. As a result of the training, did the soldiers perform successfully (i.e., meet or exceed the training standards) the commander's training objective(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
3. Were the resources adequate to accomplish the training?				
Time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training Area(s)/Classroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ammunition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training Aids/Devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. Training evaluation report.

	YES	NO	N/A	Not Observed
Trainers (principal & assistants)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
4. Did the training progress in a logical sequence toward meeting the commander's training objective(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
5. Did the soldiers undergoing training appear to be motivated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
6. Did the trainer:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Inform the soldiers of the training objective(s) to be accomplished and give reason(s) for the training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Arrange training area so all could see and hear well?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Use understandable words?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Demonstrate how to perform the objective(s) (when appropriate)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Give all necessary information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Avoid giving unnecessary information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Require "walk through" performances of the objective (if appropriate).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Encourage questions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Exhibit adequate knowledge of subject matter?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Show interest in helping the soldiers learn?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Make acceptable use of training aids?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Use assistant trainers to best advantage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Require practice until the training standards were achieved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Test soldier's ability to perform the commander's training objective?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
7. Would you consider this training adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specific recommendations:				

Figure 1. Training evaluation report (cont).

a. Training efficiency is determined by how well the trainer (and, indirectly, the training manager) used what was available (i.e., the training resources--time, personnel, facilities, equipment, funds, etc.) to train the soldiers.

b. Training effectiveness is determined by how well personnel undergoing training can meet or exceed established performance standards specified in the commander's training objective(s).

2. Training Evaluation. There are many items in the preparation and conduct of training that can be evaluated. However, only two items are critical:

a. Have training objectives (the commander's and intermediate, if needed) been developed that specify task, conditions, and training standards?

b. As a result of the training, can soldiers perform the training objectives and meet or exceed training standards?

If the answer to both questions is yes, everything else is largely secondary (e.g., the appearance of training, the presentation techniques used by the trainer(s), the format of the lesson plans, etc.).

3. How To Evaluate (Inspect) Training. A good evaluator is concerned with the conduct of training. His evaluation should concentrate on:

a. Whether complete performance-oriented training objectives have been developed.

b. Whether, as a result of the training, the soldiers undergoing training can perform the objectives(s) and meet or exceed the established training standard(s).

All other items are secondary, but by evaluating them, future training may be made more efficient. In performance-oriented training, the goal is for all the soldiers to successfully perform all the training objectives. The Training Evaluation Report (see fig. 1) is provided as a guide for developing one for a unit.

REFERENCES:

FM 21-6, How to Prepare and Conduct Military Training, Nov 75 (app D, pages 117-124)
TEC Lesson 901-071-0097-F, Evaluate Training

CHAPTER 3

SPECIAL FORCES HEAVY WEAPONS LEADER

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331-915-0801	Perform Safety Checks Before Firing Canadian Carl Gustaf 84mm Recoilless Rifle (RCL)	3-13
331-915-0802	Prepare a Canadian Carl Gustaf 84mm Recoilless Rifle (RCL) Round for Firing	3-15
331-915-0803	Boresight and Zero the Canadian Carl Gustaf 84mm Recoilless Rifle (RCL)	3-17
331-915-0804	Load, Fire, and Unload a Canadian Carl Gustaf 84mm Recoilless Rifle (RCL)	3-21
331-915-0805	Apply Immediate Action to a Canadian Carl Gustaf 84mm Recoilless Rifle (RCL)	3-27
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331-915-0800

IDENTIFY A CANADIAN CARL GUSTAF 84MM RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given three weapons of the same type.

STANDARDS:

Within 1 minute identify the Carl Gustaf RCL, type, and source of origin.

PERFORMANCE MEASURES:

1. Identify parts. (fig. 1.)
 - a. Barrel.
 - b. Venturi.
 - c. Venturi lock.
 - d. Firing mechanism.
 - e. Butt.

- f. Face pad.
- g. Front grip.
- h. Sighting equipment.
- i. Mount.

2. Operational and characteristics of major parts.

a. The barrel is a forged steel tube, shaped internally at the rear end to form a chamber. From the front of the chamber, the barrel is rifled out to the muzzle. Externally, the rear end of the barrel is enlarged in diameter. (The right side has a guide over which the venturi guideway locates in the closed position. Below the guide is an extractor recess and a hole for the firing pin together with a recess for the rear end of the firing mechanism housing.) Secured to the bottom of the rear face is a triangular-shaped projection which guides the cartridge rim into its seating. On the left side of the enlarged end of the barrel, a lug is bored and screw-threaded for the venturi axis screw. It has a stop face to limit the opening movement of the venturi. Above the lug, the barrel has a screwed hole for the venturi lock axis screw. Spaced along the lower right side of the barrel are two T-slots and two projections with screwed holes for the attachment of the firing mechanism housing. On the left side of the barrel, two keyways, one wide and one narrow, hold the telescope sight mount and rear sight bracket support. At the front of the barrel, a projection forms a housing for the front sight. Two sling swivels are fitted to the barrel for carrying purposes.

b. The venturi is in the form of a cone-shaped cylinder. At the rear end, it is fitted with a rubber band to reduce the metallic sounds which would occur when closing the venturi. At the narrow front end, the venturi has two lugs. The larger lug is fitted with a venturi lever and is machined to form a guideway which locates over the guide on the barrel. The smaller lug is bored for the venturi axis screw and has a projection which contacts the stop face on the barrel to limit the opening movement of the venturi. Formed between the two lugs is a rim which, on one side of the venturi, is cut away to fit over the cartridge guide.

c. The venturi lock is semicircular in shape and has a knob at the top to facilitate movement. The bottom of the right arm is shaped to house the rear end of the firing mechanism housing and the venturi lock return spring. At the rear of the housing, the lock is fitted with a safety projection which prevents the gun from being fired while the venturi is open or before it is fully locked in the closed position. Below the projection, the lock is recessed for the extractor which pivots on an axis screw which is screwed into the lock. The venturi is locked in the closed position by the venturi lock. The venturi lock

axis screw is housed in the left arm of the venturi lock. The stop projection above this boring acts as a bearing surface for the front face of the venturi during its closing movement and holds the lock in the forward position.

d. The percussion-type firing mechanism is mounted on the right side of the barrel. It is contained in the firing mechanism housing. The forward portion houses the trigger, sear, and safety catch. It also acts as a trigger guard and tubular fitting for the firing grip. Welded to the rear end, and at right angles to the tube, is the firing pin housing. Two T-projections and two lugs, drilled for screws, provide the means of attaching the firing mechanism to the barrel. Details of the firing mechanism are as follows:

(1) Front cap. The front cap is screwed on the front of the firing mechanism housing and forms a seating for the front end of the firing rod spring.

(2) Firing rod spring. The coiled firing rod spring acts between the front cap and the cocking slide.

(3) Firing rod. Running almost throughout the entire length of the housing, the firing rod has a knurled knob at the front to make it easy to remove from the housing. This knob passes through the firing rod spring. To the rear is the cocking slide which, in addition to forming a rear seating for the firing rod spring, has a cocking notch and a recess for the cocking handle on each side. Screwed to the rear of the rod is the cam plate which has, on the inside nearest the barrel, an inclined surface and, on the outside farthest from the barrel, a small rib and cam shoulders. This section of the rod thins out towards the rear to allow passage through the hole at the end of the firing mechanism housing.

(4) Trigger. Of conventional shape, the trigger is pivoted on its axis pin in the firing mechanism housing. The toe of the trigger houses the trigger spring and the tail is shaped to work in conjunction with the sear.

(5) Sear. The sear pivots in the rear of the trigger on its axis pin. The sear has on the top a coil spring at the front and a cocking tooth at the rear.

(6) Safety catch. Found in back of the sear, the safety catch pivots on its own shank inside the housing. The shank has a bevel which, when up, permits free vertical movement of the rear end of the sear. The lever of the safety catch is retained in either the SAFE or FIRE position by means of a raised boss.

(7) Retaining leaf spring. Secured by a screw to the housing, the retaining leaf spring locks the shank of the safety catch and the axis pins of the trigger and sear.

(8) Cocking handle. Passing through a slot in the firing mechanism housing, the cocking handle fits against the cocking slide and is held in position by two screws.

(9) Firing pin. The cylindrical-shaped firing pin passes through the hole in the barrel and is held in position by the cam plate. The head of the firing pin is prepared with a T-shaped slot chambered for the small rib and cam shoulders and the inclined surface of the cam plate.

(10) Rear cap. Screwed onto the projection at the rear end of the firing mechanism housing, the rear cap allows access to the firing pin and prevents dirt and dust from entering.

e. The butt is composed of a mount housing and shoulder piece in one unit with a butt plate attached. It is attached to the barrel by the butt clamp. The mount housing is bored to fit over the spring stem of the mount and is provided with a spring-loaded mount retaining plunger.

f. Front grip (new pattern). The new pattern front grip is a metal tube fitted with a mount retaining plunger and gives an alternate position for the mount when the gun is rested on the ground and fired from a prone position or a fire trench. It is secured to the barrel by a hinged strap and toggle catch. The grip must always be assembled with the plunger facing to the rear so that the plunger does not interfere with the firer's hold on the grip. This new grip has been ordered by the Canadian Forces.

g. Front grip (old pattern). A certain number of guns may be fitted with the old pattern front grip which is made up of a metal band clamped around the barrel and secured by clamp plates and two screws which pass through the wooden grips.

h. Face pad. Assembled on the left of the barrel, the face pad is secured by two hose clamps.

i. The mount has a strong coil spring which terminates in a two-legged support at the bottom and in a cylindrical metal section and a ring for hanging up the mount at the top. In the cylindrical metal section, two holes and a vertical groove allow for adjustment to the height of the gun. From the lower hole is a horizontal groove which leads to a third hole at an angle of 35° which shall be used when firing in the standing, kneeling, or sitting position.

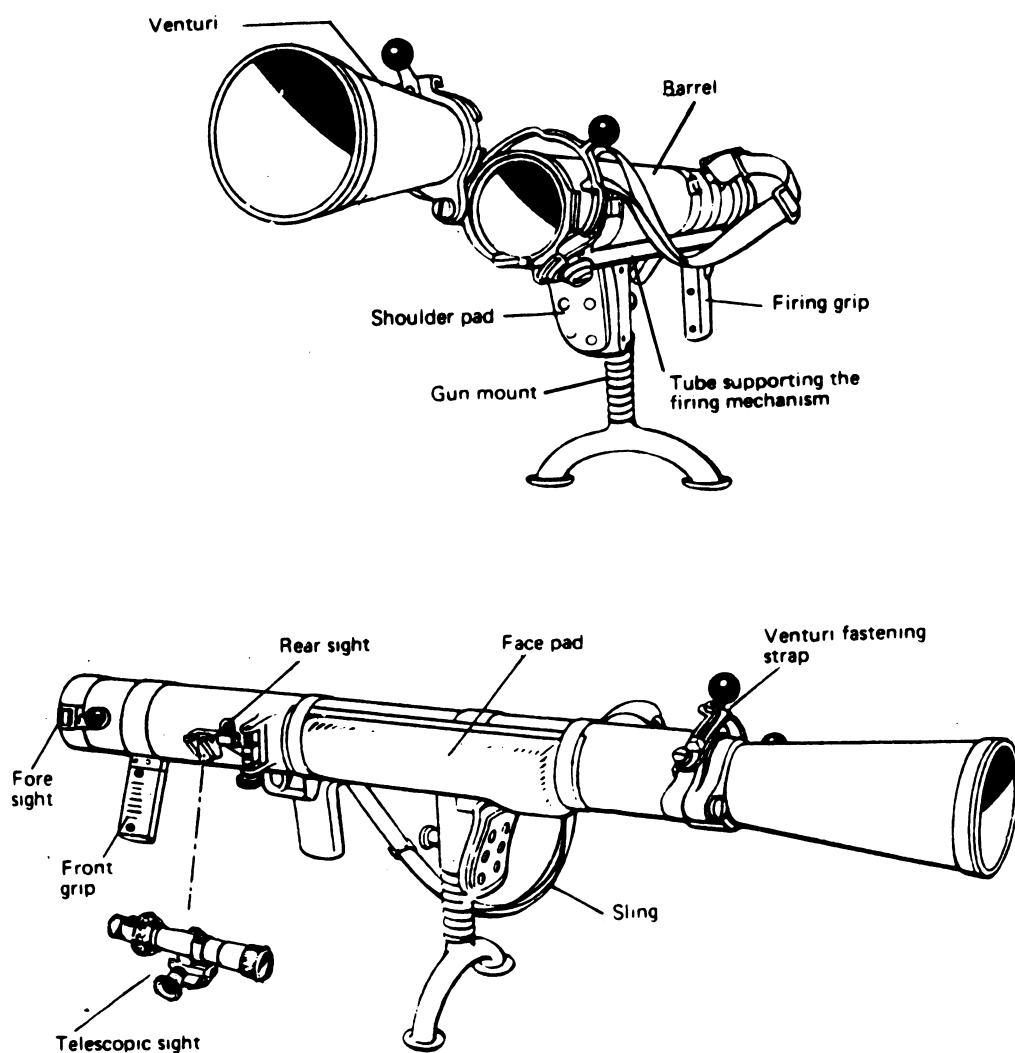


Figure 1

REFERENCE :

CFP 317 (6) (Canadian), Jan 74, chap 1, sec 4

331-915-0801

PERFORM SAFETY CHECKS BEFORE FIRING CANADIAN CARL GUSTAF 84MM
RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given a Carl Gustaf 84mm RCL.

STANDARDS:

Within 2 minutes perform safety checks before firing the Carl Gustaf.

PERFORMANCE MEASURES:

Perform safety checks before firing the Carl Gustaf 84mm RCL.

1. Check the breech and barrel for any live rounds.
2. Examine all ammunition to insure it is of the proper type.
 - a. In classrooms only dummy rounds will be used.
 - b. No dummy rounds will be taken on the range.
 - c. TPT and HEAT-T rounds will be loaded only when on the range and only when the weapon is pointed down the range.

WARNING. Never stand directly behind the rifle or allow any portion of the body (particularly the arms) to be directly behind the breech opening when opening or closing a breech with a live round in the chamber.

WARNING. Always determine the layout of the back blast area (due to blast and flying debris) before firing.

d. Pace off (or measure) a distance of 30 meters straight back from the breech, along the line of the bore.

e. Pace off (or measure) a distance of 30 meters to the right and left on an angle of 45° from the breech. (This will give you an arch area behind the rifle 30 meters at all points from the breech of the rifle--the rear danger area.)

WARNING. Do not fire rifle if obstructions or obstacles are in a position to confine the rear blast. Change weapon location if necessary.

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 1, sec 1, para 103

331-915-0802

PREPARE A CANADIAN CARL GUSTAF
84MM RECOILLESS RIFLE (RCL) ROUND FOR FIRING

CONDITIONS:

You will be given one round each of L40A4 (HEAT-T), FFV65 (HEAT-T), C46 (TPT), FFV65 (TPT), 6.5mm practice (with or without tracer), and an inert round (TPT).

STANDARDS:

Within 2 minutes of fire command prepare designated round for firing.

PERFORMANCE MEASURES:

1. Identify ammunition by classification.

a. 84mm (HEAT-T) L40A4. Black anodized finish is unpainted. A small yellow band encircles the body just below the distance tube. Yellow identification markings on the body and the tracer symbol "T" in red below details of the explosive filling.

b. 84mm (HEAT-T) FFV65. Black anodized finish is unpainted with yellow identification markings stenciled on the body.

c. 84mm (TPT) FFV65. Projectile's body is painted light blue with white identification markings stenciled on the body. The distance tube retains its black anodized finish and the tracer symbol "T" is stenciled in red above the identification markings.

d. 84mm (TPT) C46. The designation allocated the Swedish FFV65 when produced and manufactured in Canada. The markings are the same as the 84mm (TPT) FFV65 above.

e. 6.5mm with tracer. The tip of the projectile is painted red with a black band around the cannellure. One-half of the cartridge case base is blackened. The cartridge case is stamped with manufacturer's number and the last two digits of the year of manufacture. Nontracer round is not color-coded.

f. 84mm (dummy) L42A1. Projectile is painted dark blue. The cartridge has a black anodized finish and white markings are stenciled on both the projectile and the cartridge case.

2. Prepare ammunition for firing.

- a. Remove from packaging materials.
- b. Separate the two injection molded tubes by removing the two self-tapping screws.
- c. Unscrew the cap and remove the O-ring.
- d. Remove the round.

3. Inspect ammunition.

WARNING. Explosive ammunition or components containing explosives must be handled with appropriate care at all times.

- a. Inspect packings to see that the packing is not broken or damaged.
- b. Inspect distance tube insuring that it is not cracked or broken.
- c. Reject round if distance tube is damaged.
- d. Inspect cartridge to make sure it has not been dislodged or damaged.
- e. Reject round if dislodged or damaged; keep the fuse or nose from being knocked.

NOTE: The essential difference between the HEAT-T FFV65 and the HEAT-T L40A4 cartridges is the fusing system.

(1) The FFV65 cartridge has a base detonating fuse. It is initiated electrically by a piezoelectric element located around the shoulder of the cartridge. The fuse is located in the base screw assembly of the projectile assembly.

(2) The L40A4 cartridge has a point detonating fuse. It is initiated by the force of impact firing the priming composition in the fuse. The fuse is located in the forward end of the projectile distance tube.

NOTE: The piezoelectric crystals in a fired projectile which fails to function and becomes a blind may be hypersensitive to a change in temperature, a slight blow, or other force which causes stress in the crystal.

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 5

331-915-0803

BORESIGHT AND ZERO THE CANADIAN
CARL GUSTAF 84MM RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given a Carl Gustaf RCL, front and rear boresights, and an assistant gunner.

STANDARDS:

Within 10 minutes, boresight and zero the Carl Gustaf RCL.

PERFORMANCE MEASURES:

NOTE: Boresighting. This method is used to mechanically align the line of sight with the axis of the barrel, with the sight set at 0. A clearly defined aiming point at least 300 meters away must be used when boresighting.

Zeroing. This method is used to align, by live firing, the line of sight with the axis of the barrel, with the actual ranges set on the sight. Zeroing is done at 100 meters. All boresightings must be confirmed by firing. The gun is not considered zeroed until this is done.

1. Boresights.

a. Rear boresight. This has a small aperture and is shaped like the base of the round. There is a recess for the cartridge guide, which is fitted by opening the venturi, inserting the boresight with thumb and finger, and closing the venturi.

b. Front boresight. This is inserted into the muzzle so that the straight edges of the boresight are horizontal and up.

2. Boresighting with telescopic sight unit.

a. Set the range knob to 0.

b. Select a clearly defined aiming point at not less than 300 meters.

c. Insure that the gun is firmly mounted on the boresighting stand. If a stand is not available, both gunner and assistant gunner get into a prone position. The assistant gunner lies directly in back of the gun, looking through the bore.

d. Gunner looks through the telescope and assistant gunner will indicate when the axis of the bore is laid on the aiming point. If there is a possibility of getting the wrong aiming point and the gun is on a stand, gunner should confirm the aiming mark by looking through the bore. Check to see if the gun has been boresighted.

e. Gunner loosens the locking screws from the elevation and horizontal drums and alines the graticule pointer with the aiming point.

f. Tighten the locking screws.

g. Loosen the elevation and horizontal clamping screws and set the scales to 0 using the white center or index line.

h. Recheck the boresighting.

3. Boresight with open sights.

a. Be sure that the gun is held securely and alined on the aiming mark with the telescopic sight unit off and the open sight folded out.

b. Aim through the open sights to see if the gun is already boresighted. If not, using the range knob and deflection screws, move the backsight onto the aiming point.

c. Without disturbing the range knob, unclamp the range indicator, set the indicator to 0 using the center of the aiming point, and reclamp.

d. Recheck the boresighting.

4. Zero with the telescopic sight unit.

a. Set the range to 100 meters and set the scale of the vertical drum to the appropriate temperature setting by loosening the locking screw and moving the entire drum.

b. Sight through the telescope and fire a 3-round group of TPT ammunition.

c. Measure the vertical and horizontal distance from the aiming point to the mean point of impact (MPI).

d. If necessary, loosen the locking screws and adjust the elevation and horizontal drums as required. One mil equals 3.5 inches on the target at 100 meters. If the MPI is to move to the right, move the horizontal drum in the direction indicated by "L" and the appropriate arrow and vice versa. If the MPI is to go up, move the elevation in the direction indicated by the minus sign and the appropriate arrow and vice versa.

e. Tighten the locking screws.

f. Fire three more rounds. If satisfactory, reset the scales to 0 from the temperature setting used in paragraph a above.

5. Zero with open sights.

a. Confirmation with the open sights follows the same procedure as that used with the telescopic sight unit.

b. Adjustment of the back sight. One division equals 2 mils or 178mm (7 inches) on the target at 100 meters. The sight must be folded to make the vertical adjustment because the range indicator must be moved each time in accordance with the adjustment required.

c. When the weapon is correctly zeroed, the MPI should fall level with the point of aim and 100mm (4 inches) to the right of it, with a permissible variation of 4 inches in all directions.

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 2, sec 3, para 211, 212, and 213

331-915-0804

LOAD, FIRE, AND UNLOAD
A CANADIAN CARL GUSTAF 84MM RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given a boresighted Carl Gustaf RCL, a No. 78MK1 telescope, two rounds of HE ammunition, an assistant gunner, and a stationary target at 300 meters.

STANDARDS:

Within 5 minutes load, fire, and unload the Carl Gustaf RCL, scoring at least one hit of two.

PERFORMANCE MEASURES:

1. Load the weapon.

- a. Gunner:

- (1) After the command "LOAD," install the telescopic sight unit and fold out iron sights; or fold out the iron sights and install the luminous sights if required.

(2) Push the cocking handle forward with the right thumb, returning the right hand to the firing grip with the index finger running along the trigger guard.

(3) Put the safety catch on "S" with the left hand and return the left hand to the front grip.

(4) Give the order "LOAD" to assistant gunner.

b. Assistant gunner:

(1) Repeat "LOAD."

(2) Open the breech by pushing the venturi lock knob forward with the right hand and rotating the venturi with the left hand on the venturi lever.

(3) Visually examine the breech and barrel for dirt or unburnt propellant. If the chamber is dirty, clean it.

(4) Pick up the round, nose forward, with the right hand using the underhand grip; remove the rubber protective cover and grasp the rim of the round with the left hand, placing the finger in the recess in the rim of the round.

(5) Insert the round into the chamber, insuring that the recess is in line with the cartridge guide.

(6) Close the breech with the left hand.

(7) Tap the venturi lock knob to the rear to insure that the lock is closed.

(8) Check the backblast area and report "READY."

(9) Prepare the next round for firing.

2. Sight.

a. 78 MK1 telescope.

(1) Estimate the range to the target.

(2) Set the range on the range knob.

(3) Position eye in the rear of the telescope.

(4) Move head forward and backward until a full view is obtained.

(5) Place the pointer or appropriate lead mark on the center of the visible mass.

(6) If target is moving across the line of fire, lead it as follows:

(a) Lead 1 (5 mph), the small rectangle.

(b) Lead 2 (10 mph), the short vertical line.

(c) Lead 3 (20 mph), the long vertical line.

b. Open sight.

(1) Move the front and rear sights out from the position against the barrel.

(2) Set the estimated range using the correct temperature mark.

(3) Take a normal rifle sight picture.

(4) If target is moving across the line of fire, lead it as follows:

(a) Lead 1 (5 mph), halfway between the blade and the inner edge of the horizontal bar.

(b) Lead 2 (10 mph), the inner edge of the horizontal bar.

(c) Lead 3 (20 mph), increase the amount of the lead to halfway between the inner edge of the horizontal bar and the ring.

NOTE: Strong winds must be considered when firing, particularly at longer ranges; no specific amount of "aim off" is stated but, as a guide, in a strong wind at a range of approximately 300 meters, aim at the rear edge or upwind side of the turret as opposed to the center of the visible mass.

3. Fire the weapon.

a. Gunner:

(1) Identify the target.

(2) Place safety catch on "F."

(3) Aim and apply slight pressure on the trigger.

(4) When satisfied with aim, fire the weapon.

(5) Observe flight and strike of projectile.

(6) Recock the weapon.

(7) Maintain sight picture; command either "LOAD" or "UNLOAD."

(8) Before firing a second or subsequent rounds, make the sight adjustments or alterations necessary to insure a hit.

(9) At any time should the backblast area not be clear, the assistant will announce "CEASE FIRE."

(10) When "CEASE FIRE" is called, repeat "CEASE FIRE," put the safety catch on "S" and, if necessary, unload until the rear area is clear.

(11) This method shall be used from all firing positions.

b. Assistant gunner:

(1) Repeat either "LOAD" or "UNLOAD" and perform the appropriate procedure.

(2) Constantly monitor the backblast area and announce "CEASE FIRE" if it is not clear.

(3) After the backblast area is cleared, announce "CLEAR" to the gunner.

4. Unload the weapon.

a. Gunner:

(1) Place the safety catch on "S" with the left hand.

(2) Return the left hand to the front grip.

(3) With the right hand on the firing grip, place the right index finger along the trigger guard.

(4) Announce "UNLOAD."

(5) After receiving "CLEAR" from assistant gunner, place safety catch on "F," press the trigger, and remove or fold the sights.

b. Assistant gunner:

(1) Repeat "UNLOAD."

(2) Open the breech and tap the venturi lock knob forward to partially eject the round or empty casing.

(3) Grasp the rim of the round or empty casing with the left hand and remove it from the chamber. If it is a casing, it shall be cast aside out of the backblast area. If it is a live round, it shall be caught with an underhand grip of the right hand.

(4) Close the breech with the left hand.

(5) Tap the venturi lock knob to the rear.

(6) Report "CLEAR."

(7) Replace the rubber protective cover and replace the round in its container, if applicable.

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 3, sec 2 and 3

331-915-0805

APPLY IMMEDIATE ACTION TO A CANADIAN
CARL GUSTAF 84MM RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given a Carl Gustaf RCL one L42A1 (dummy) round and an assistant gunner.

STANDARDS:

Within 3 minutes apply immediate action to correct a misfire.

PERFORMANCE MEASURES:

1. Perform misfire procedures.
 - a. Gunner:
 - (1) Maintain point of aim.
 - (2) Recock the weapon with the right thumb.
 - (3) Put the safety catch to "S" with the left hand.
 - (4) Announce to assistant gunner "CHECK VENTURI LOCK."

(5) After assistant gunner taps venturi lock to rear and reports "VENTURI LOCK CHECKED," report "VENTURI LOCK CHECKED."

(6) Place the safety catch on "F," re-aim, and attempt to fire.

b. Assistant Gunner:

(1) After gunner announces "CHECK VENTURI LOCK," repeat the announcement.

(2) Tap the venturi lock knob to the rear and report to gunner "VENTURI LOCK CHECKED."

2. Procedures when weapon fails to fire a second time.

a. Gunner:

(1) Announce "MISFIRE."

(2) Wait 1 minute while maintaining sight picture in the event of a possible hangfire.

(3) If weapon has not fired after 1 minute, recock the weapon with the right thumb.

(4) Place the safety catch on "S" with left hand.

(5) Announce "MISFIRE UNLOAD."

b. Assistant gunner:

(1) Report "MISFIRE."

(2) Wait 1 minute.

(3) Report "MISFIRE UNLOAD" and remove the round at least 50 meters away from the weapon.

NOTE: Primer Struck. After removing the misfired round, inspect the primer. If the primer is fully struck, report "PRIMER STRUCK." Gunner repeats "PRIMER STRUCK." Lay the misfired round aside for disposal, reload automatically if the target is still in view, and report "READY." If the target is not in view, report "CLEAR."

NOTE: Mechanical Breakdown. If, on examination of the primer, it has been found either lightly struck or not struck at all, report "MECHANICAL BREAKDOWN." Gunner repeats "MECHANICAL BREAKDOWN." Close the venturi and report "CLEAR."

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 3, sec 3

331-915-0806

MAINTAIN THE CANADIAN CARL GUSTAF 84MM RECOILLESS RIFLE (RCL)



CONDITIONS:

You will be given a Carl Gustaf RCL, cleaning rod, cleaning rod head, nylon cleaning brush, oiling brush, lubricating oil, clean rags, and a screwdriver.

STANDARDS:

Within 15 minutes perform operator maintenance on the Carl Gustaf RCL.

PERFORMANCE MEASURES:

1. Disassemble.

a. Clear the weapon.

b. Remove firing rod spring and firing pin.

(1) Remove the front cap while holding the cap firmly against the pressure of firing rod spring (fig. 1).

(2) Withdraw the spring from the firing mechanism housing (fig. 2).

- (3) Push the cocking handle as far forward as possible.
- (4) Unscrew the rear cap and withdraw firing pin (figs. 3, 4, and 5).
- c. Remove cocking handle and firing rod.
 - (1) Unscrew screws of cocking handle and withdraw the handle from the head of the firing rod (figs. 6 and 7).
 - (2) Press the trigger and withdraw rod from the front of housing (figs. 8 and 9).
- d. Remove retaining leaf spring safety catch, trigger, and sear.
 - (1) Remove screw and remove retaining leaf spring from the trigger and sear axis pins and the safety catch shank (figs. 10, 11, and 12).
 - (2) Remove safety catch (figs. 13 and 14).
 - (3) Withdraw axis pins and remove trigger with its spring (figs. 15 and 16).
 - (4) Withdraw the sear axis pin and remove sear with spring.
- e. Remove extractor and extractor pin.
 - (1) Unscrew extractor axis screw and remove extractor with spring (figs. 17 and 18).
 - (2) Separate extractor and spring by removing screw (figs. 19, 20, and 21).

NOTE: Stripping beyond this point will be carried out only by a weapons technician.

2. Maintain weapon. To maintain the weapon in a serviceable condition it should be cleaned daily, before and after firing.

- a. Daily cleaning of weapon.
 - (1) If fouling is present, assemble the cleaning rod and attach the nylon cleaning brush. With the breech open, insert the brush from the breech end and clean the barrel.
 - (2) After removing all fouling or, if fouling is not present, attach the oiling brush lightly oiled to the cleaning rod, and oil the breech and barrel.

(3) Leave a thin film of oil in the barrel and venturi.

(4) Clean and lightly oil the exterior parts of the gun.

(5) The telescopic lens will be cleaned with the brush and cloth provided. The metal parts of the sight unit should be lightly oiled.

(6) Clean and pack the cleaning materials.

NOTE: Under no circumstances should the telescopic sight unit be stripped by anyone other than unit weapons technicians.

NOTE: Under adverse climatic or environmental conditions, the following actions should be taken:

(a) In sandy or extremely dusty areas, all oil should be removed from the weapon to prevent the collecting of sand or dirt. Care must be taken to prevent the formation of rust.

(b) Under very cold conditions, all oil should be removed and moving parts lubricated with graphite or special oil for use in cold weather.

(c) Under conditions of extreme dampness, a heavy film of oil should be placed over the entire weapon, and the weapon should be closely checked for the formation of rust.

NOTE: Periodically and particularly after use in sandy or very wet areas, the mechanism of the gun should be stripped and cleaned. This is conducted as follows:

(d) Disassemble the firing mechanism.

(e) Clean and lightly oil all parts.

(f) Clean and lightly oil the interior of the firing mechanism housing, using a rifle cleaning rod and flannelette.

(g) Clean and lightly oil the trigger mechanism housing.

(h) Assemble the mechanism.

b. Clean before firing. Insert cotton waste or a rag in the eyelet of the cleaning rod and thoroughly dry the barrel from the breech end. Dry the exterior of the venturi. Wipe the exterior of the weapon dry.

NOTE: After conducting cleaning before firing, the clearance between the front face of the venturi and the rear face of the breech at the venturi axis screw must be checked. With the venturi in the open position, the 0.25mm venturi clearance gauge "NO GO" is held against the joint. It should not be possible to insert the gauge into the joint. If it can be inserted, the unit weapons technician must be informed and adjustment made to the setting of the venturi axis screw.

c. Clean weapon after firing.

(1) Clean and oil the weapon immediately. If this is not possible, oil the barrel and inner face of the venturi. This will loosen the fouling and facilitate in later cleaning.

(2) Special attention should be given to daily cleaning for a period of 3 days after each firing to prevent the accumulation of moisture as the weapon "sweats."

3. Reassemble weapon.

a. Replace extractor and extractor spring.

(1) Place spring onto extractor and secure with a screw.

(2) Replace extractor and spring and secure with the extractor axis screw.

b. Replace retaining leaf spring, safety catch, trigger, and sear.

(1) Replace sear with spring and insert the sear axis pin.

(2) Replace trigger with its spring and insert axis pins.

(3) Replace safety catch.

(4) Connect the retaining leaf spring to the trigger, sear axis pins, and the safety catch shank and replace the screw.

c. Replace cranking handle and firing rod.

(1) Replace the rod into the front of the housing; then replace the trigger.

(2) Replace cocking handle to the head of the firing rod and secure with a screw.

d. Replace firing rod spring and firing pin.

(1) Insert firing pin and secure it by screwing on the rear cap.

(2) Push the cocking handle as far forward as possible.

(3) Using the front cap to absorb the pressure of the firing rod spring, place it into the firing mechanism housing and screw the front cap on.

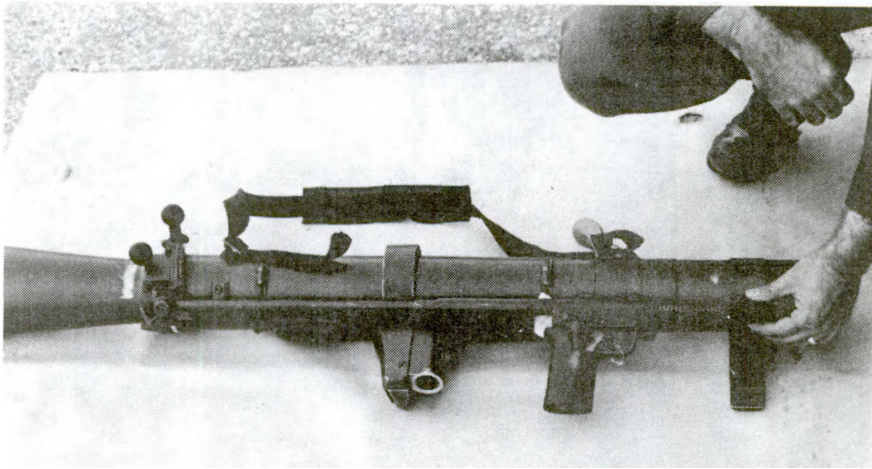


Figure 1

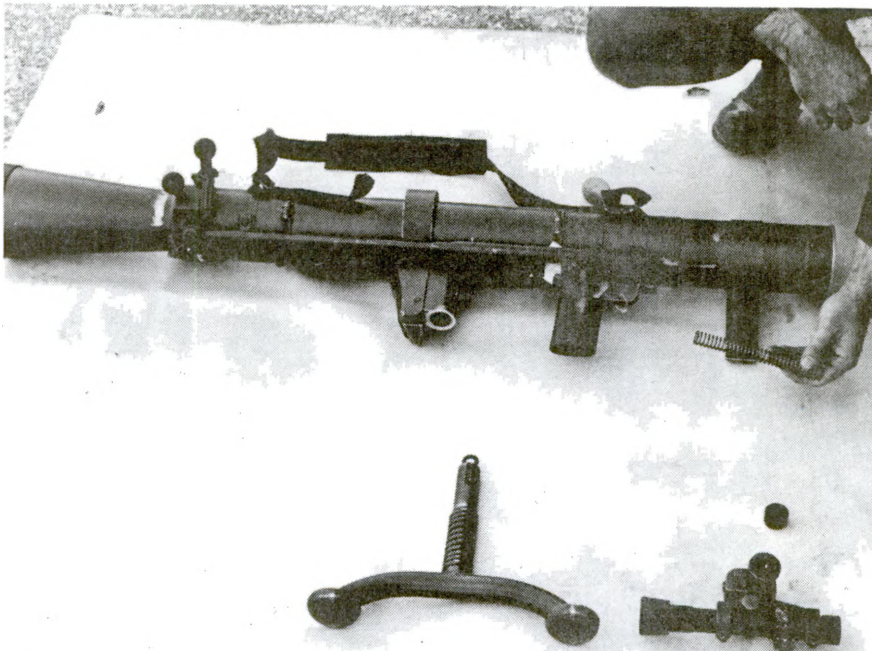


Figure 2

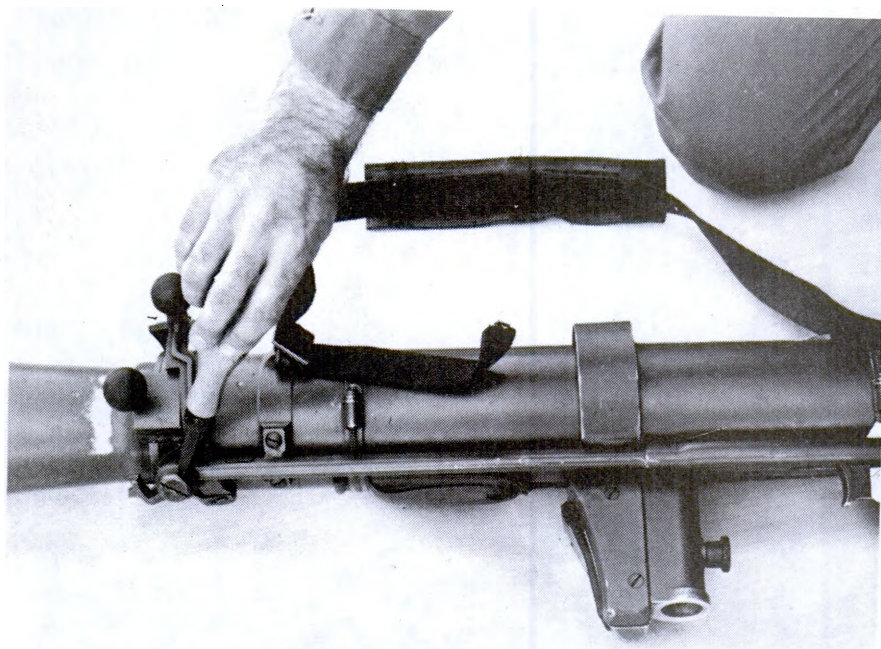


Figure 3

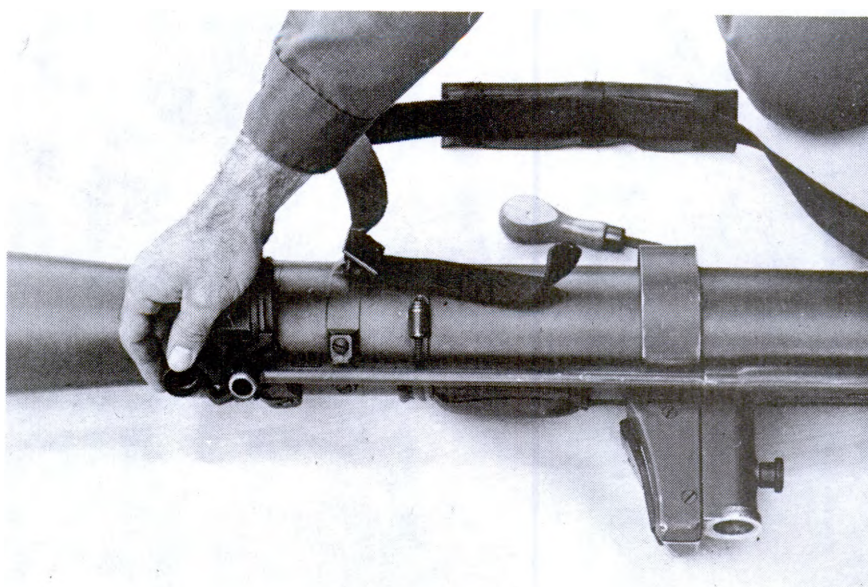


Figure 4



Figure 5

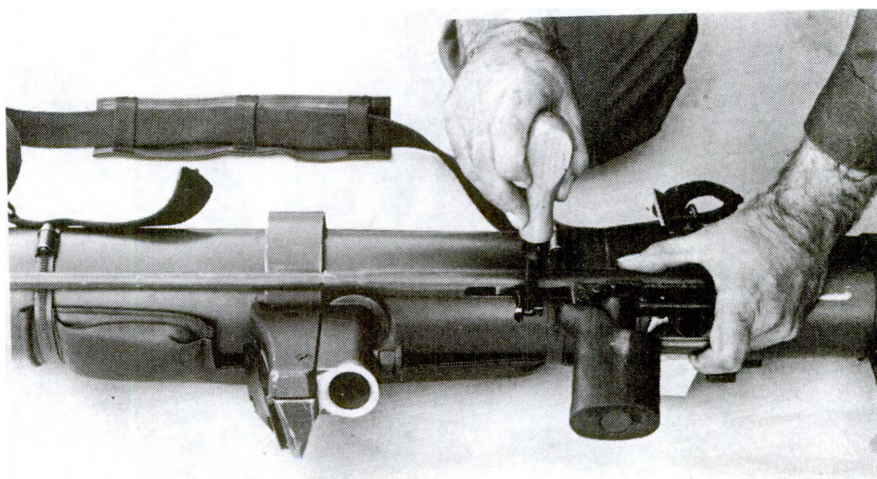


Figure 6

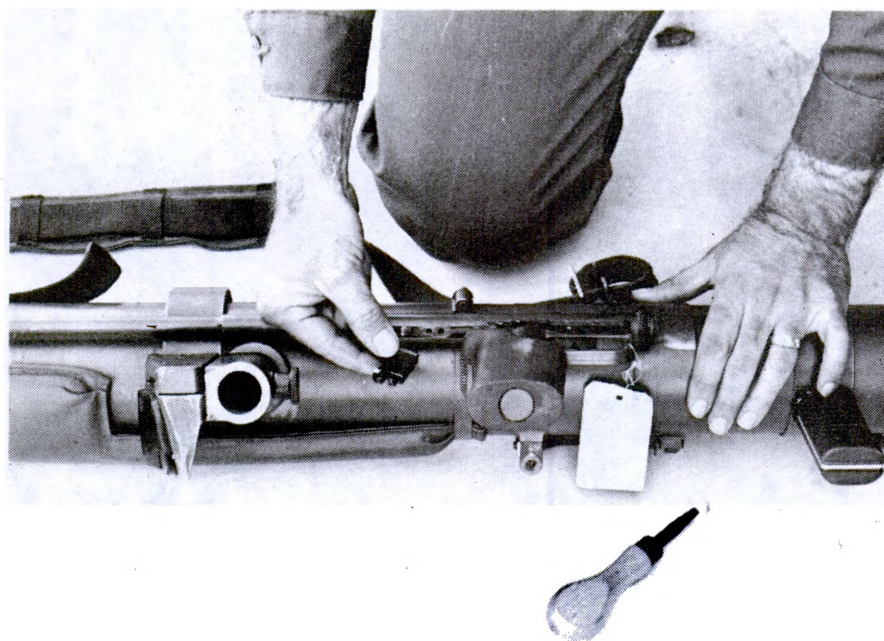


Figure 7

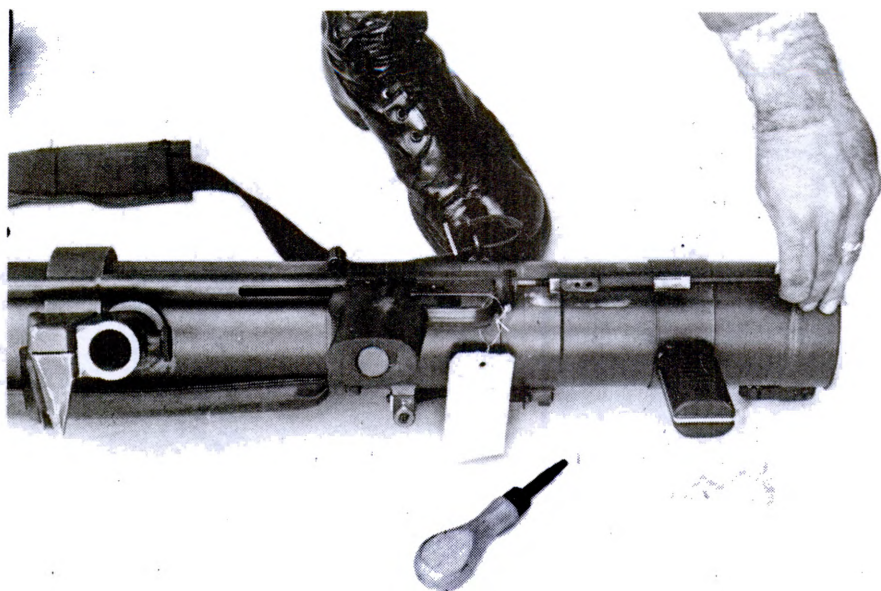


Figure 8

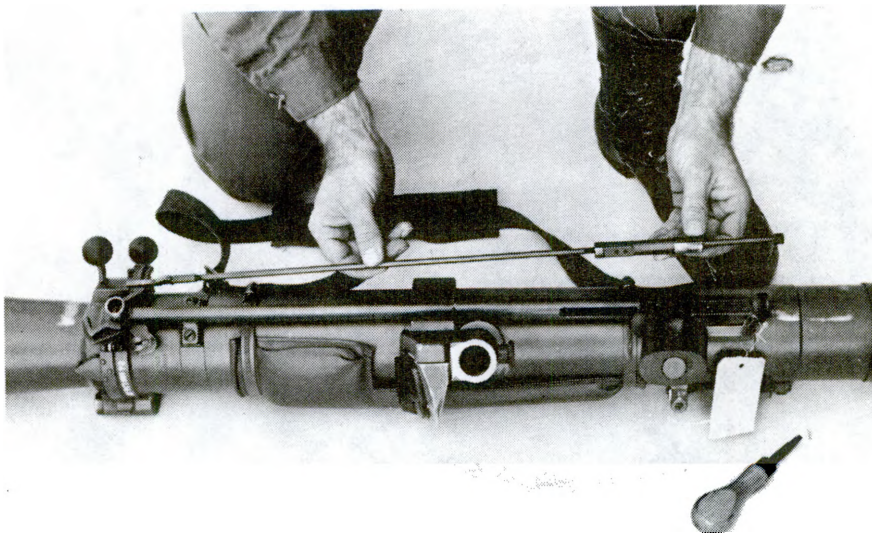


Figure 9



Figure 10

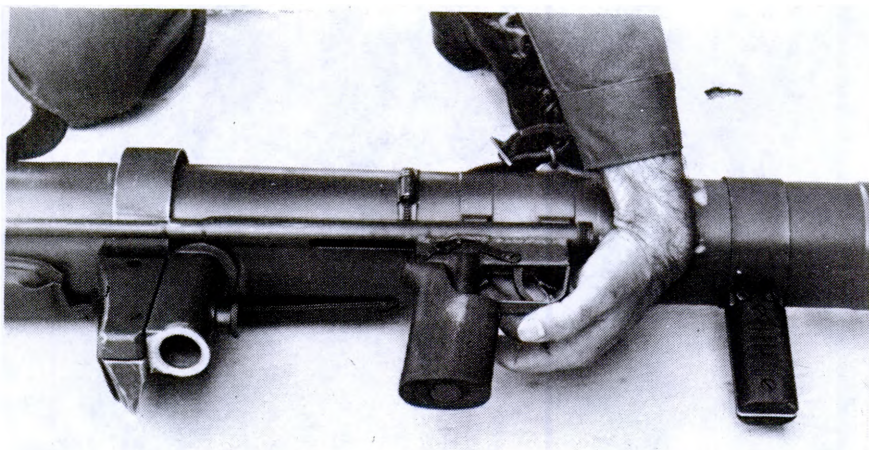


Figure 11

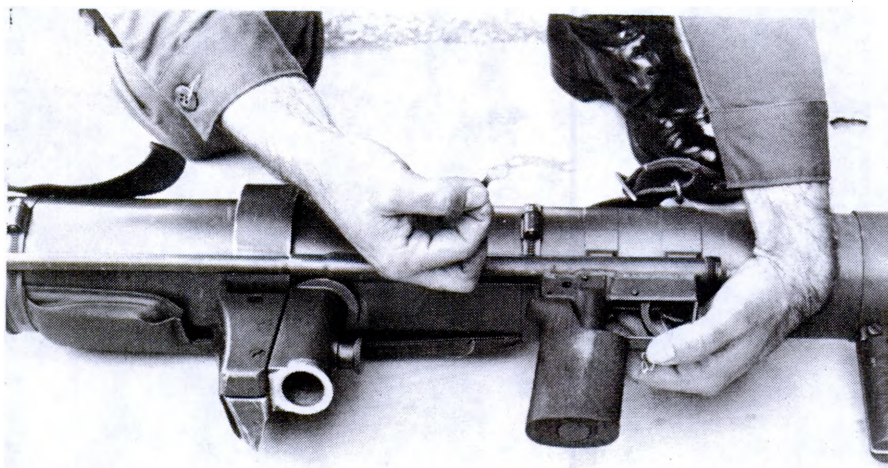


Figure 12

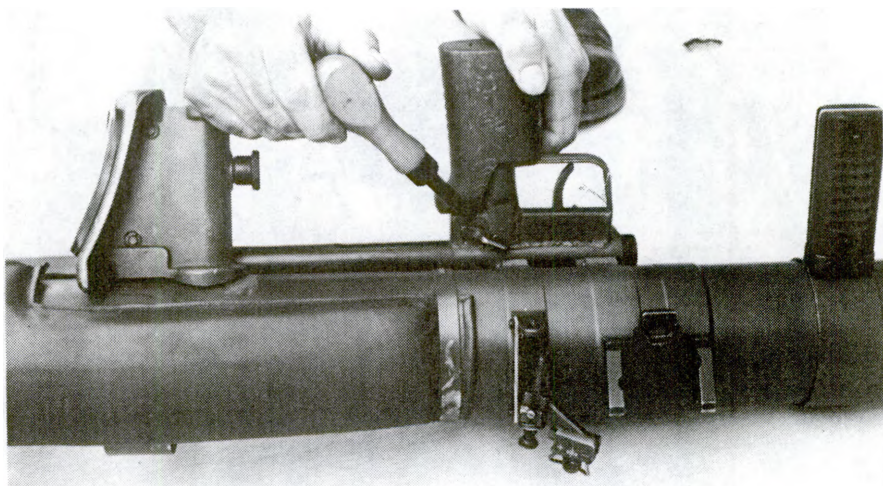


Figure 13

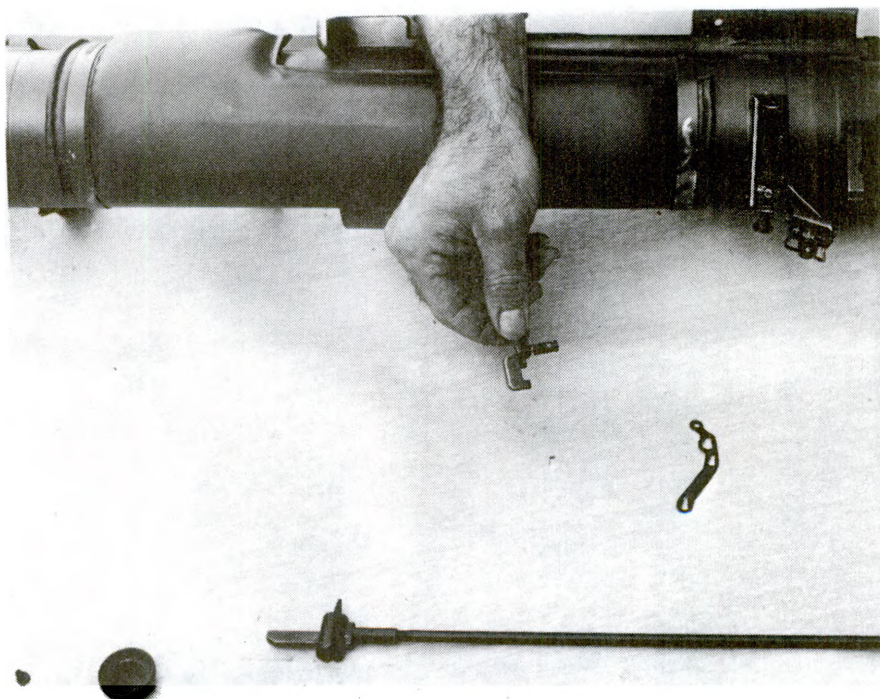


Figure 14

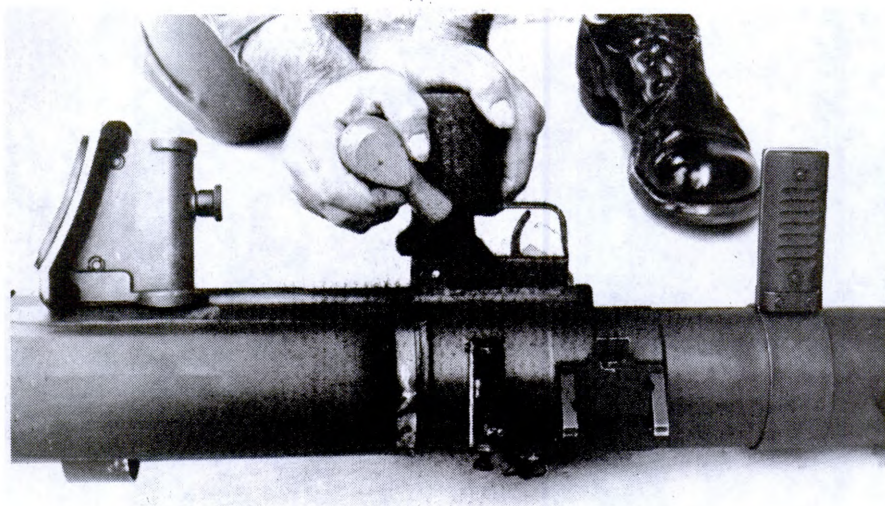


Figure 15

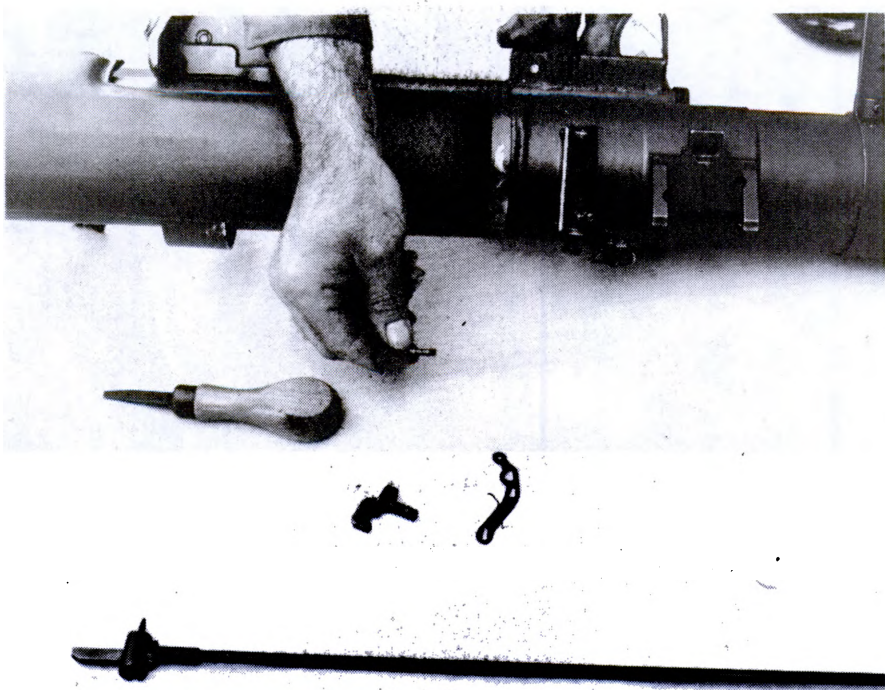


Figure 16

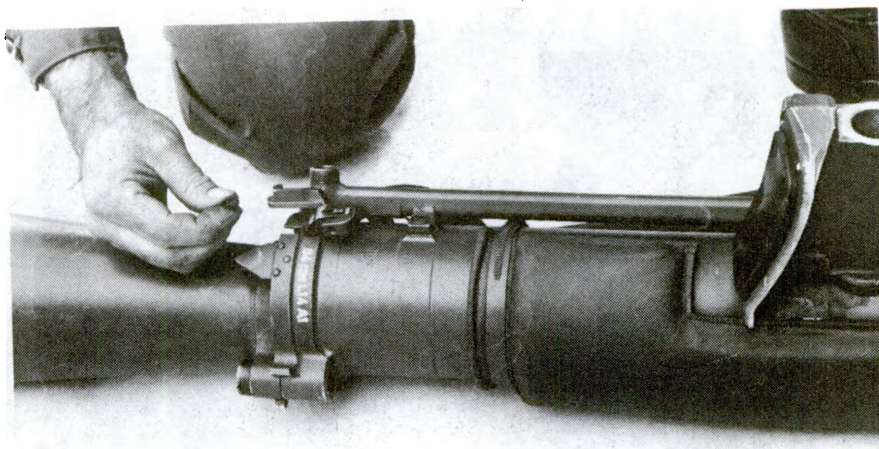


Figure 17

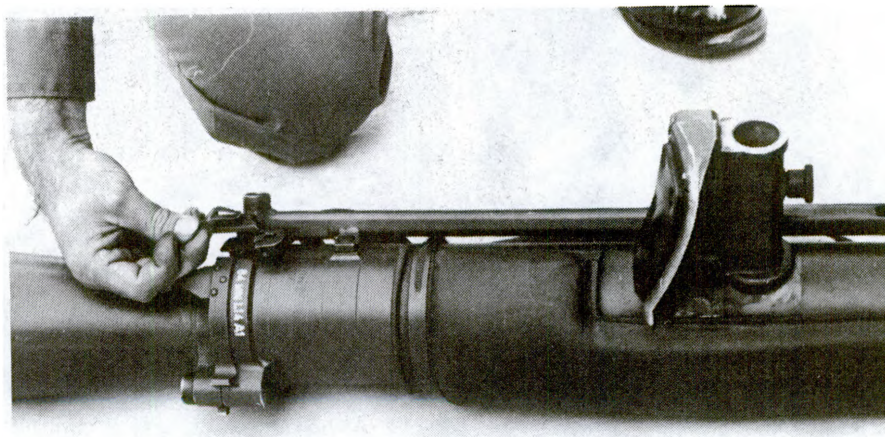


Figure 18

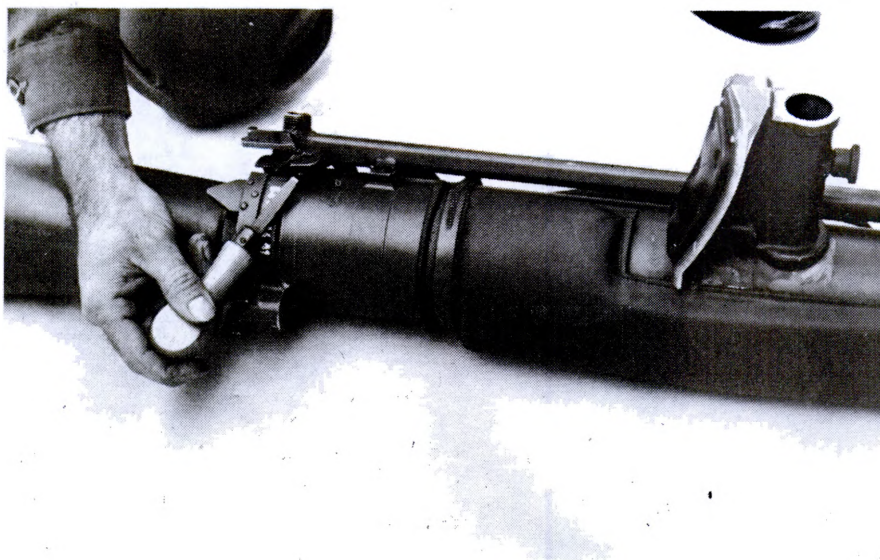


Figure 19

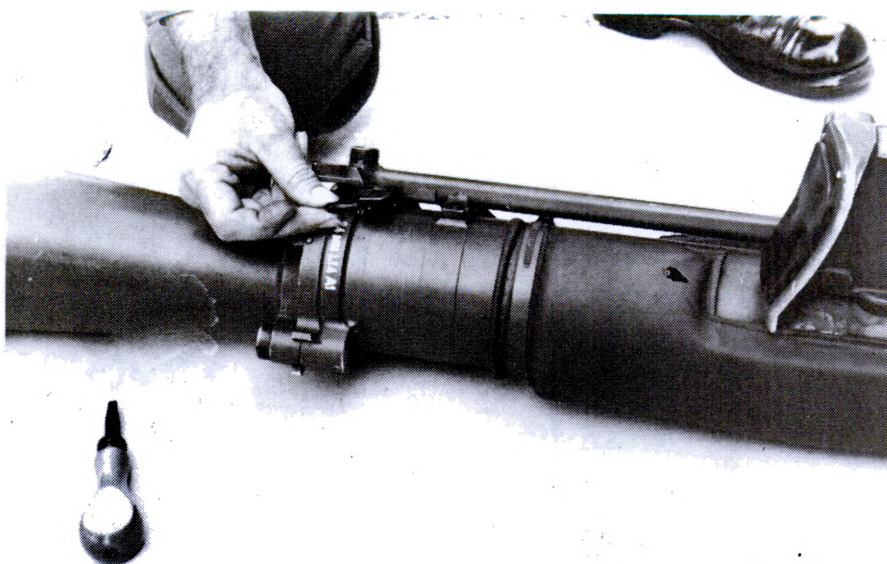


Figure 20

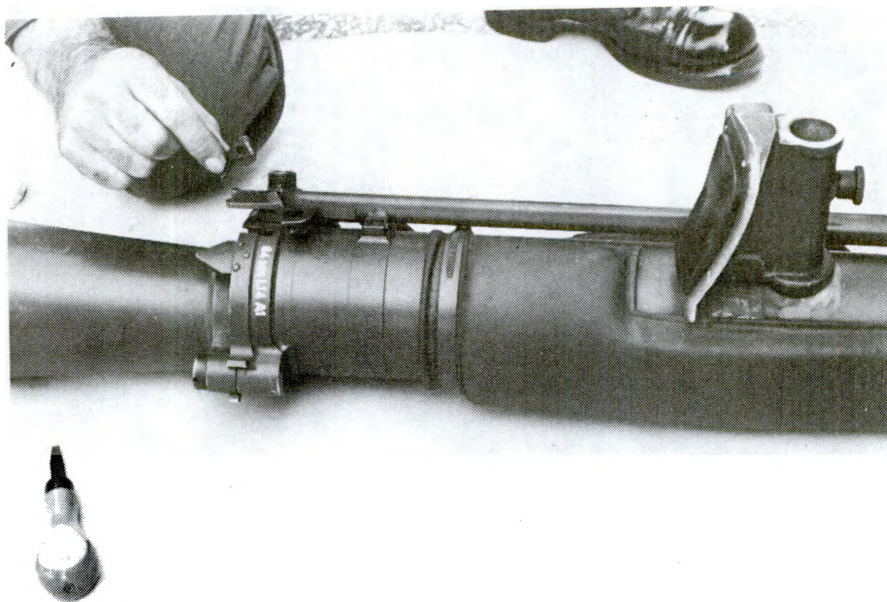


Figure 21

REFERENCE:

CFP 317 (6) (Canadian), Jan 74, chap 1, sec 5

331-915-0807

PREPARE SOVIET RPG 2 AMMUNITION FOR FIRING



CONDITIONS:

You will be given one round of RPG 2 ammunition and a propellant charge.

STANDARDS:

Within 10 seconds correctly prepare the round for firing.

PERFORMANCE MEASURES:

1. Identify defective rounds. If dented, round is unserviceable.
2. Inspect propellant for serviceability.
 - a. Clean dirty propellant charge.
 - b. Dented propellant is serviceable unless cardboard is cut or broken.
 - c. Any moisture on propellant makes propellant unserviceable.
3. Connect round and propellant. Screw round and propellant together.
4. Remove safety cap.

REFERENCE:

None

331-915-0808

ENGAGE TARGETS WITH SOVIET RPG 2 AND APPLY IMMEDIATE ACTION
TO REDUCE A STOPPAGE



CONDITIONS:

You will be given an RPG 2, three rounds of ammunition (two live and one inert), three targets (one moving tank at 50-100 meters, one stationary tank at 50-100 meters, and one bunker at 100-150 meters).

STANDARDS:

On a live firing range, you will select and assume a firing position for each target. You must hit at least one of the targets within the prescribed time limits (moving tank, 30 seconds; stationary tank, 15 seconds; bunker, 15 seconds). When a stoppage occurs, you will use immediate action to reduce it.

PERFORMANCE MEASURES:

NOTE: The minimum requirement for an RPG 2 fixed firing position is a hole in the ground approximately 3 meters (front to rear) by 2 meters (side to side) and armpit deep (for the gunner).

1. Select and assume firing position. Firing positions are determined by the amount of cover available.

a. Standing position should be used only when trees, buildings, or other tall objects are available for cover. A standing position is less stable than the kneeling position.

b. Kneeling position is used when low cover, such as shrubbery or low walls, is available. This position is less stable than the prone position.

c. The prone position is used when only very low cover, such as rocks or ridges of earth, is available. Although the prone position is the most stable, the backblast may pick up more leaves, twigs, pebbles, or other debris than in other positions.

2. Perform safety check.

a. Clear backblast area of personnel and equipment. The backblast area is a triangle with three equal sides 25 meters long. The top of the triangle is at the breech of the weapon. Also clear area within 5 meters on either side of launcher.

b. Perform operational check.

c. Check ammunition.

3. Load launcher.

a. Place weapon on "SAFE."

b. Slide rocket into bore.

c. Align metal stud on rocket with notch on muzzle.

4. Sight launcher.

a. Sight picture with stationary target (no wind).

(1) Determine range to the target.

(2) Select the range scale graduation on the sight corresponding to the range to the target.

b. Sight picture with stationary target (with winds).

(1) Determine range to the target.

(2) Select the range scale graduation on the sight corresponding to the range to the target.

(3) Make correction to the left or right equal to 10 mils per 10 mph of wind speed.

(4) Place the target along the horizontal line at the range selected.

c. Sight picture with moving target (no winds).

(1) Determine range to the target.

(2) Select the range scale graduation on the sight corresponding to the range to the target.

(3) Establish a lead in the direction of target travel by moving the sight in direction of travel 10 mils for each mph of speed.

(4) Place the target along the horizontal line at the range selected.

d. Sight picture with moving target (with crosswinds).

(1) Determine range to the target.

(2) Select the range scale graduation on the sight corresponding to the range to the target.

(3) Place the target along the horizontal line at the range selected.

5. Fire launcher.

a. Take weapon off "SAFE."

b. Cock hammer.

c. Inhale and hold breath while firing.

d. Pull trigger.

6. Immediate action.

a. Check stud screw and muzzle notch alinement.

b. Recock weapon.

c. Sight target.

d. Pull trigger.

e. If weapon still does not fire:

(1) Wait 30 seconds.

(2) Then remove round. NOTE: Be very careful when unloading a misfire.

(3) Gently lay defective round approximately 15 meters away from troops, pointed downrange.

(4) Prepare new round.

(5) Reload.

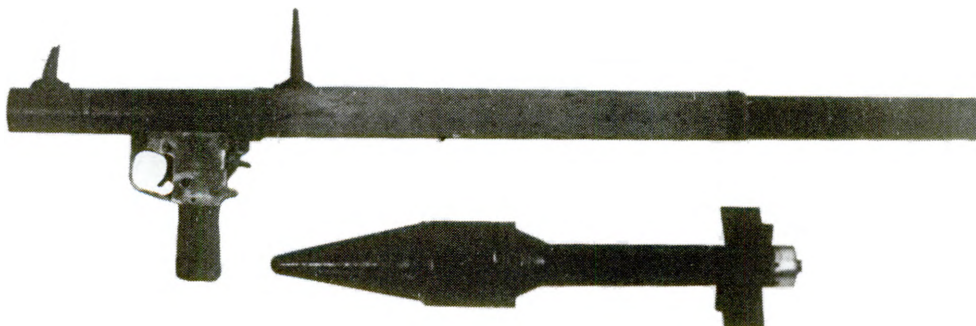
(6) Reassume firing position.

REFERENCE:

None

331-915-0809

MAINTAIN A SOVIET RPG 2 (ROCKET-PROPELLED GRENADE, 40MM)
AND AMMUNITION (80MM)



CONDITIONS:

You will be given a Soviet RPG 2, two inert rounds of RPG 2 ammunition, LSA lubricant or weapons lubricating oil, drift punch or cleaning rod, rifle bore cleaner, clean rags, and a 5-foot cord.

STANDARDS:

Within 15 minutes:

1. Clean the launcher and ammunition.
2. Apply light coat of oil where needed.
3. Perform operational check.

PERFORMANCE MEASURES:

1. Identify parts.
 - a. Trigger assembly.
 - b. Forward trigger pin.

c. Rear trigger pin.

2. Disassemble launcher (partial). NOTE: Partial disassembly of the launcher is performed for cleaning, lubricating, and inspecting. Further disassembly could result in loss of and damage to parts that could make the launcher unusable.

a. Clear launcher.

b. Remove trigger assembly.

(1) Push forward trigger pin from left to right with drift punch or cleaning rod.

(2) Push rear trigger pin from left to right with drift punch or cleaning rod.

(3) Lift trigger assembly out of launcher.

3. Clean and oil launcher and trigger assembly.

a. Moisten rag with bore cleaner and wipe outside of launcher and trigger assembly to remove all foreign matter.

b. Apply light coat of oil to outside of trigger assembly and launcher.

c. To clean bore, attach rag moistened with bore cleaner to one end of the 5-foot cord. Drop other end of cord through bore and pull rag through. Repeat, using clean rags, until rag comes through clean.

d. Oil bore by pulling lightly oiled rag through bore, leaving a light coat of oil on the inside surface.

4. Clean ammunition.

a. Round.

(1) Wipe dirt or grime from round with a dry cloth.

(2) Remove corrosion from round by rubbing corroded area with a cloth moistened with rifle bore cleaner until corrosion is gone.

(3) DO NOT oil round.

b. Propellant.

(1) Brush dirt from propellant with dry cloth.

(2) DO NOT use oil, rifle bore cleaner, or any other wet or oily substance on propellant.

5. Reassemble launcher. Replace trigger assembly by placing it into position in the launcher. Push the forward and rear trigger pins from right to left to lock the trigger assembly in place.

6. Perform operational check.

a. Check safety system by placing unloaded launcher on "safe" and pulling trigger. Hammer should not move forward. If hammer falls forward, replace weapon.

b. Check firing system by taking unloaded launcher off "safe" and pulling trigger. Hammer should fall forward. If hammer does not fall forward, replace weapon.

REFERENCE:

None

331-915-0810

PREPARE A SOVIET RPG 2 OR RPG 7 RANGE CARD

CONDITIONS:

You will be given an RPG 2 or RPG 7 in a defensive firing position, a designated sector of fire, paper, pencil, a 1:50,000 scale map of the area, and a lensatic compass.

STANDARDS:

Within 15 minutes correctly prepare a range card (fig 1).

PERFORMANCE MEASURES:

1. Identify gun position. Place a dot in the center of the paper. Draw in the military symbol for the gun type.

2. Orient to north. Draw an arrow pointing from the dot to magnetic north. Place the capital letter "N" at the point of the arrow.

3. Sketch in limits of designated sector. Draw broken lines from the dot out to the points limiting the designated sector.

4. Orient to identifiable terrain feature.

a. Using correct military symbols, sketch a nearby identifiable terrain feature in its relative position to the gun. Draw a straight line between the gun position and the terrain feature. Place an arrow point on the gun end of the line.

(1) Estimate the distance (in meters) from the gun position to the feature (correct to within 50 meters) and record it on top of the arrow line between them.

(2) Measure the azimuth in mils (correct to within 80 mils) from the gun to the terrain feature. Convert to a back azimuth and enter as "MAG AZ...." beneath the arrow line.

b. Repeat process with several other identifiable terrain features, if possible.

5. Identify avenues of approach.

- a. Identify target area along avenues of approach.
- b. Using correct military symbols, sketch in nearby recognizable terrain features. Draw a straight line between the gun position and each target area. Place an arrow point on the target end of the line.
- c. Determine distance and azimuth from the gun to target and record distance in meters above the line, and azimuth in mils below the line.

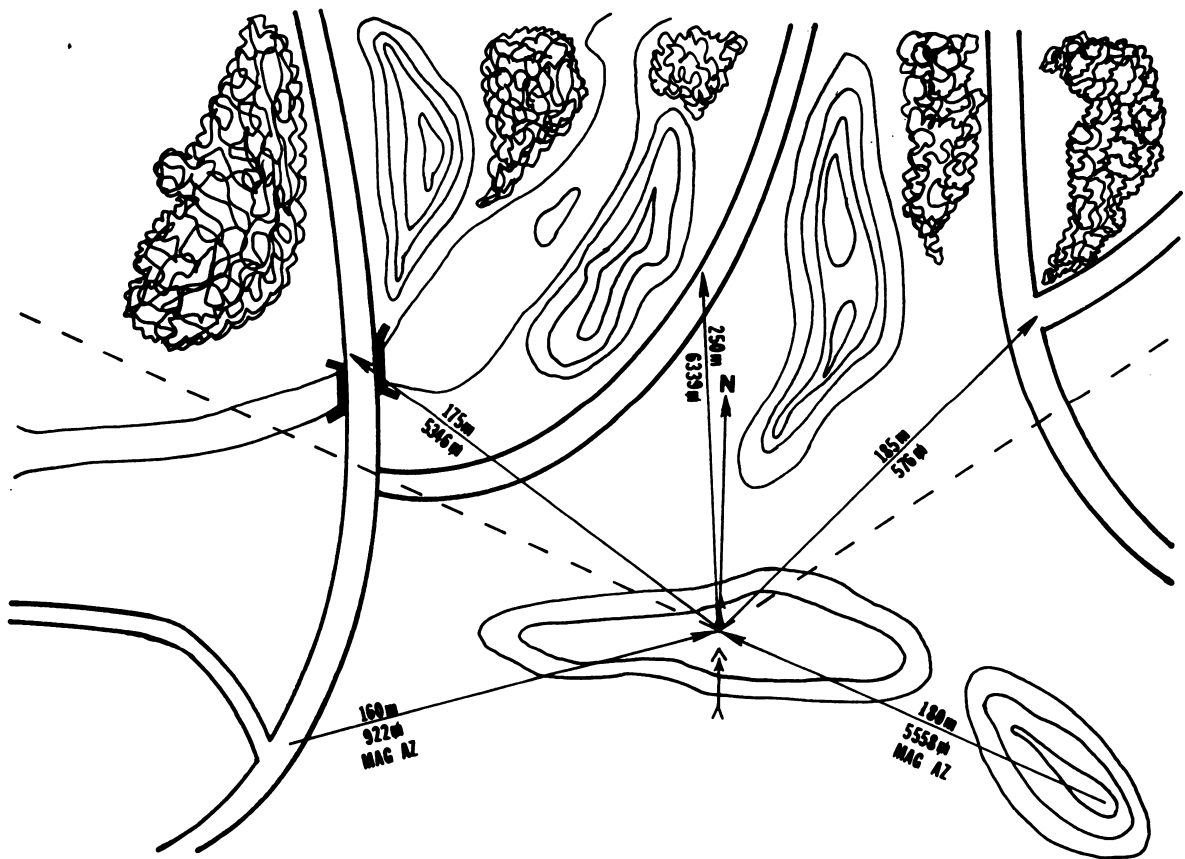


Figure 1. Range card.

REFERENCE:

None

331-915-0811

PREPARE SOVIET RPG 7 AMMUNITION FOR FIRING



CONDITIONS:

You will be given a clean round of RPG 7 ammunition and a clean propellant charge.

STANDARDS:

Within 10 seconds correctly prepare the ammunition for firing.

PERFORMANCE MEASURES:

1. Identify defective rounds.
 - a. Reject dirty or corroded round.
 - b. If dented, round is unserviceable.
2. Inspect propellant for serviceability.
 - a. Clean dirty propellant charge.
 - b. Dented propellant is serviceable unless cardboard is cut or broken.
 - c. Any moisture on propellant makes propellant unserviceable.
3. Connect round and propellant. Screw round and propellant together.

NOTE: Do not remove safety pin and safety cap until ammo is loaded into launcher.

4. Remove safety pin.

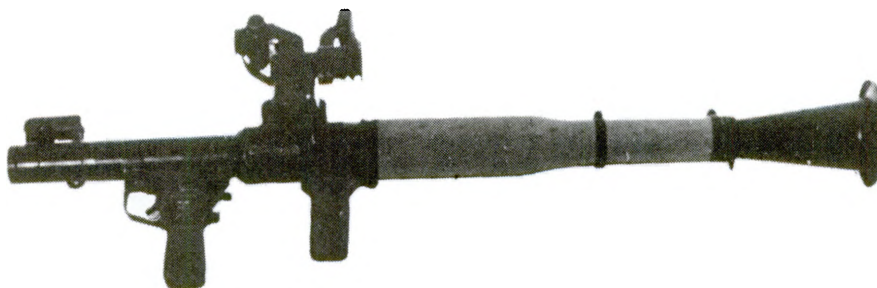
5. Remove safety cap.

REFERENCE:

None

331-915-0812

BORESIGHT A SOVIET RPG 7 (V OR D MODEL)



CONDITIONS:

You will be given an RPG 7, a boresighting gauge, thread, tape or rubber band, and an aiming point at a distance of 300 meters.

NOTE: The RPG 2 does not require boresighting.

STANDARDS:

Within 15 minutes, correctly boresight the RPG 7.

PERFORMANCE MEASURES:

Boresight the RPG 7.

- a. Clear weapon.
- b. Mount launcher on stand or sandbags for support.
- c. Secure thread to boresight gauge with tape or rubber band, forming cross hairs (fig. 1).
- d. Place boresight gauge into tube of launcher.

e. Position launcher so that the cross hairs are on the aiming point (fig. 2).

f. Sight through the telescopic sight. The "+" in the upper part of the telescopic sight should be alined with the aiming point. If necessary, adjust sight. To do this:

(1) Unscrew the cover of the lateral adjustment screw. Insert the screwdriver blade into the slit of the screw and rotate until the "+" sign is alined with the vertical plane of the distant aiming point (figs. 3 and 4).

(2) Loosen the three side screws provided on the temperature correction knob 1.5 to 2 revolutions. Rotate the elevation adjustment screw (in the center) until the "+" sign is on the same point as the cross hairs of the boresight gauge (fig. 5).

(3) Recheck boresight gauge.

(4) If "+" sign of the sight and the cross hair of the boresighting gauge is alined, boresighting is complete. If not, repeat adjustment.

(5) Retighten the three screws.

(6) Replace the cover on the lateral adjustment screw.

NOTE: The Chinese have copied the RPG 7 and modified it for their needs. Their version is 3 pounds lighter than the Soviet model and has improved iron and optical sights. Both of the Chinese sights simplify the crosswind correction problem. Reducing the training requirements tends to increase accuracy. The optical sight has two range stadia, one for US and one for Warsaw Pact armor. It also has an additional stadia for estimating range using target length.

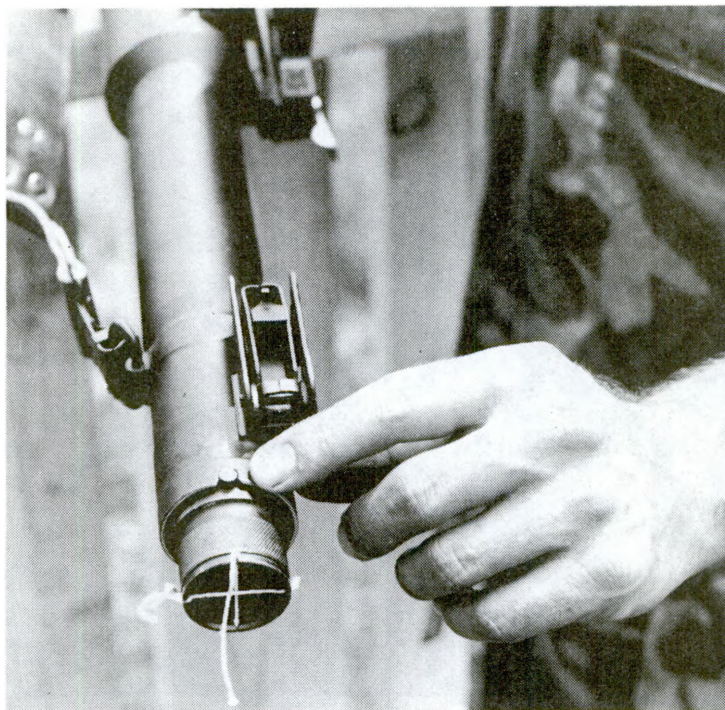


Figure 1



Figure 2

3-63



Figure 3

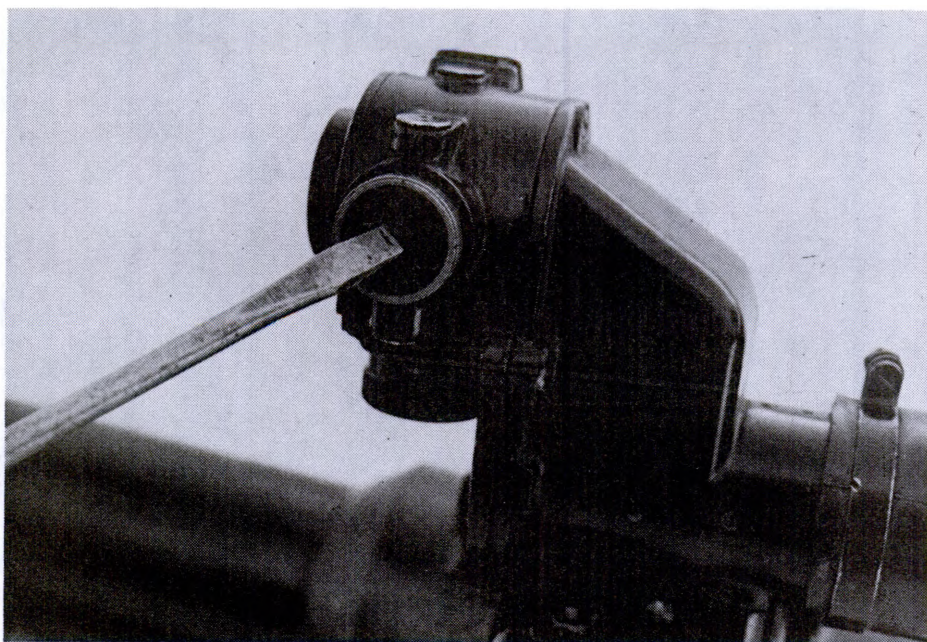


Figure 4

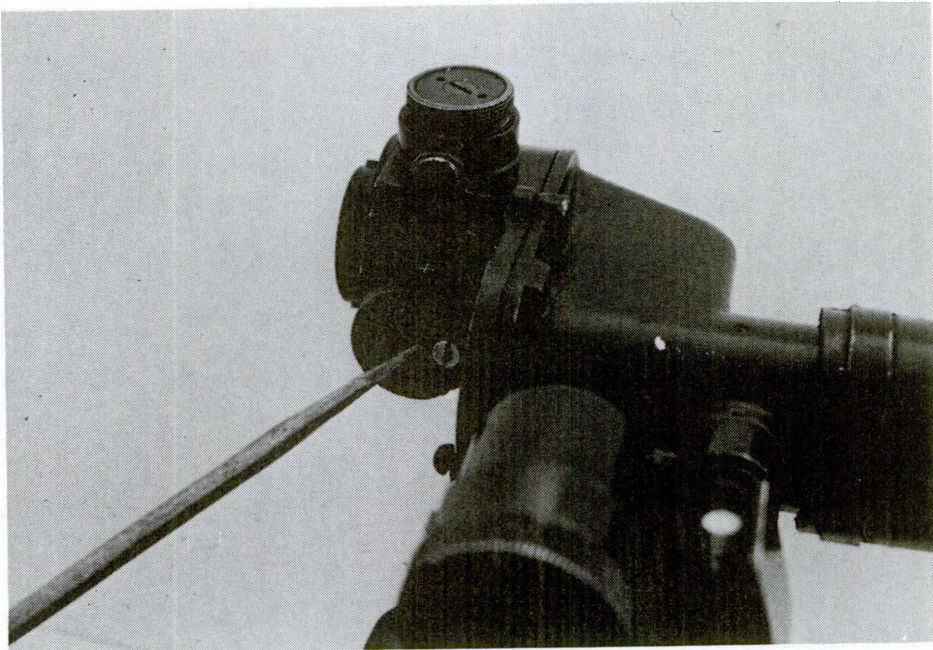


Figure 5

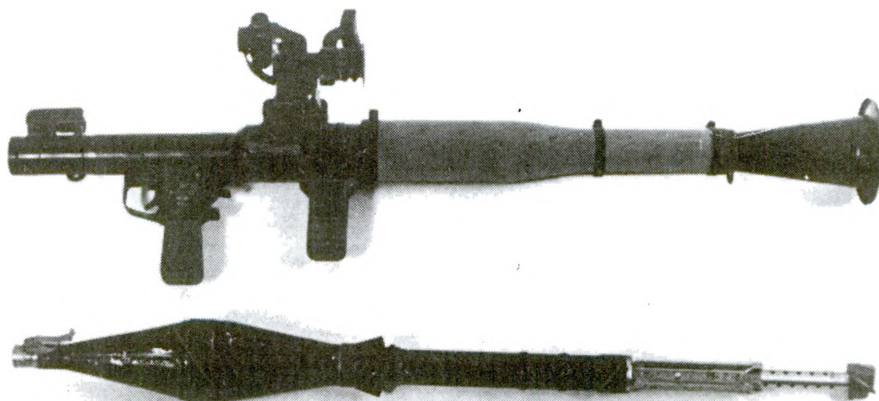
REFERENCE:

None

FM 31-11C-S

331-915-0813

ENGAGE TARGETS WITH A SOVIET RPG 7
AND APPLY IMMEDIATE ACTION TO REDUCE A STOPPAGE



CONDITIONS:

You will be given an RPG 7 with telescopic sight, three rounds of ammunition (two live, one inert), and a target at 300 meters.

STANDARDS:

Within 1 minute select and assume a firing position and fire the RPG 7, hitting the target at least once. If a stoppage occurs, apply immediate action to reduce it.

PERFORMANCE MEASURES:

1. Procedures for using telescopic sight (fig. 1).
 - a. Range stadia measures to within range estimates.
 - b. Range line is placed over the target center of mass at the measured range.
 - c. Center lead line is moved left or right for moving target lead and then for crosswind corrections.

NOTE: The RPG 7 round, when fired, tends to fly into the wind rather than with the wind. If he fires into a crosswind, an RPG 7 gunner must correct his sight picture for wind direction and velocity. Figures 2 and 3 illustrate the average effect of first round hits as the wind velocity increases.

2. Determine range with telescopic sight.

a. Lay the scale on the target so that the target is between the horizontal line and the curved broken line.

b. Read the range to the target over the point where the top of the target touches the curved line (fig. 4).

NOTE: The height of a target at position 6 on the curved line is 2.7 meters. Targets at other points on the curved line must be adjusted up or down to equal 2.7 meters. The difference in tenths is multiplied by 4 times the number located above the target. Example:

Height of target	3.2m
Height at position 6 on curved line	<u>2.7m</u>
Target height difference .5 x 4 x 6 = 120	<u>.5m</u>
Range for sight	600m
Adjustment for height	<u>120m</u>
Range to target	720m or 700m

c. Add the adjustment total to the number (hundreds of meters) on the curved line above the target. Round off the number.

NOTE: If the target height deviates by not more than 0.3 meters, round to nearest 50 meters. If more than 0.3 meters, round to nearest 100 meters.

3. Sight picture with stationary target (no wind) (fig. 5).

a. Determine range to the target.

b. Select the range scale graduation on the sight corresponding to the range to the target.

c. Place the target along the horizontal line at the range selected, centered on the double vertical lines of the target.

4. Sight picture with stationary target (with winds) (fig. 6).

a. Determine range to the target.

b. Select the range scale graduation on the sight corresponding to the range to the target.

c. Make correction to the left or right equal to 10 mils per 10 mph of wind speed.

d. Place the target along the horizontal (east-west) line at the range selected and center on the vertical (north-south) line corresponding to the correction for winds.

e. For moving targets, establish appropriate leads.

NOTE: The minimum requirement for an RPG 7 fixed firing position is a hole in the ground approximately 3 meters (front to rear) by 2 meters (side to side) and armpit deep (for the gunner).

5. Select and assume correct firing position.

a. Firing positions are determined by the amount of cover available.

(1) Standing position should be used when trees, buildings, or other tall objects are available for cover. The standing position is less stable than the kneeling position.

(2) Kneeling position is used when low cover, such as shrubbery or low walls, is available. This position is less stable than the prone position.

(3) The prone position is used when very low cover, such as rocks or ridges of earth, is available. Although the prone position is the most stable position, the backblast may pick up more leaves, twigs, pebbles, or other debris than in other positions.

6. Perform safety check.

a. Clear rear danger (backblast) area of personnel and equipment. The rear danger area is a triangle with three equal sides 25 meters long. The top is at the breech of the weapon. Also clear area within 5 meters on either side of launcher.

b. Perform operational check.

c. Check ammunition.

7. Load launcher.

a. Slide rocket into bore.

b. Aline metal stud on rocket with notch on muzzle (fig. 7).

8. Sight launcher.

- a. Determine range by estimation.
 - b. Set sight picture.
9. Fire launcher.
- a. Cock hammer.
 - b. Control breathing. Inhale and hold breath while firing.
 - c. Pull trigger.
10. Apply immediate action.
- a. Check stud screw and muzzle notch alinement.
 - b. Recock weapon.
 - c. Sight target.
 - d. Pull trigger.
 - e. If weapon still does not fire:
 - (1) Wait 30 seconds.
 - (2) Replace safety pin and cap.
 - (3) Then remove round.

NOTE: Exercise extreme caution when unloading a misfire.
--

- (4) Gently lay defective round approximately 15 meters away from troops, pointed downrange.
- (5) Prepare new round.
- (5) Reload.
- (7) Reassume firing position.

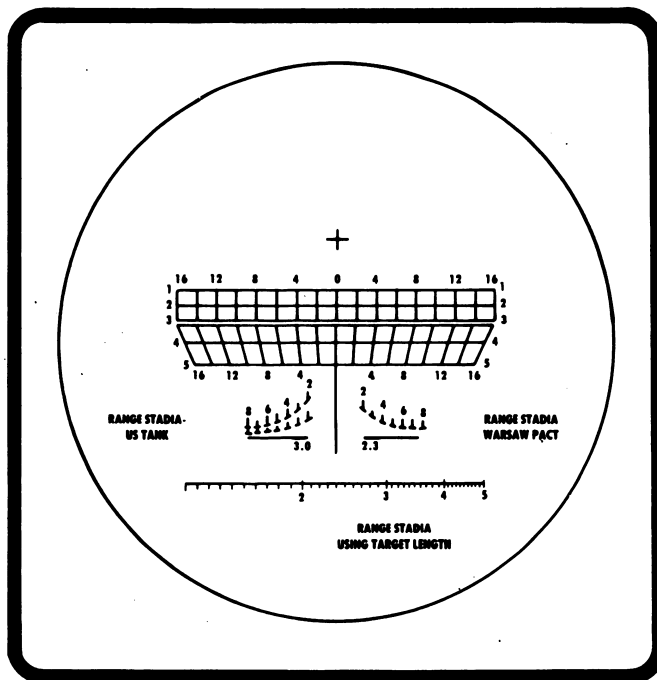


Figure 1. Telescopic Sight Picture.

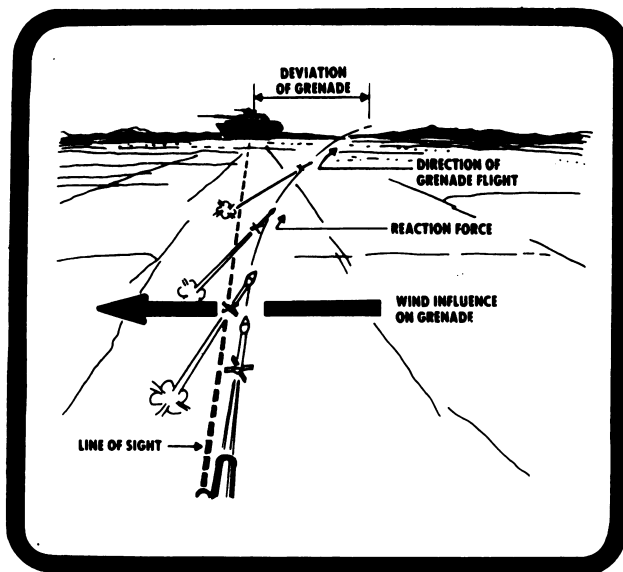


Figure 2. Effect of wind velocity.

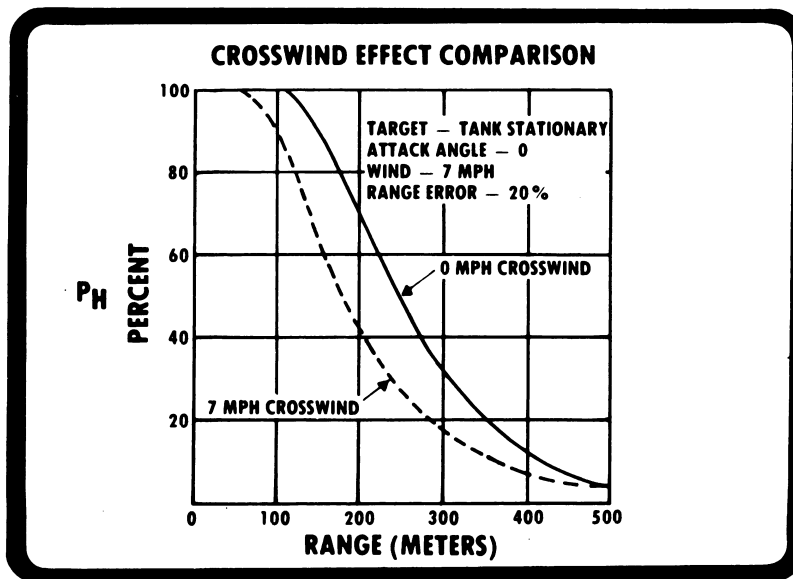


Figure 3. Crosswind effect comparison.

In a 7 mph wind the gunner cannot expect to get first round hits more than 50 percent of the time beyond 180 meters.

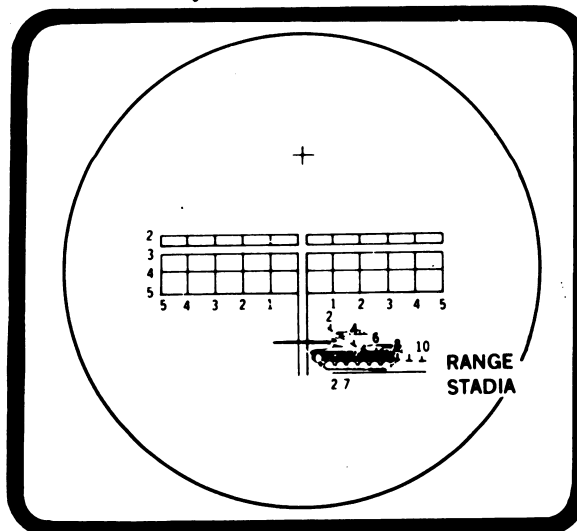


Figure 4. Aiming with the optical sight.

- Center the full height of the target between the stadia lines. The tank's treads rest on the bottom lines.

- Read the range, in hundreds of meters, on the upper stadia line where the top of the target touches the upper line.

- The target in the example above is about 300 meters from the gunner.

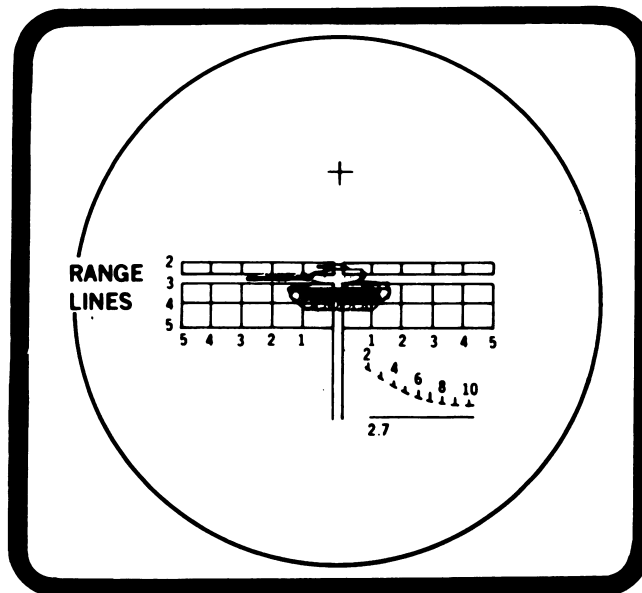


Figure 5. Sight picture with stationary target (no wind).

- Move the center of the sight reticle over the target mass along the line of the measured range.
- The example above depicts a stationary tank at 300 meters.
- If there were no crosswinds, the gunner could fire with this sight picture.

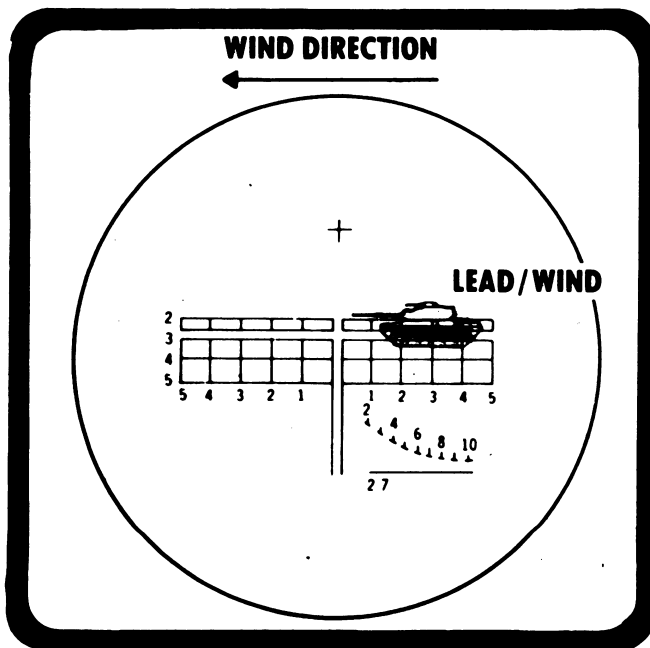


Figure 6. Sight picture with stationary target (with winds).

- If a crosswind is blowing from right to left, move the center reticle to the left of the target, 10 mils for each 10 mph of wind speed.
- In a crosswind blowing from left to right, move the reticle to the right of the target along the measured range line.
- The sight picture above shows the correction for a stationary target in a wind blowing from the right.

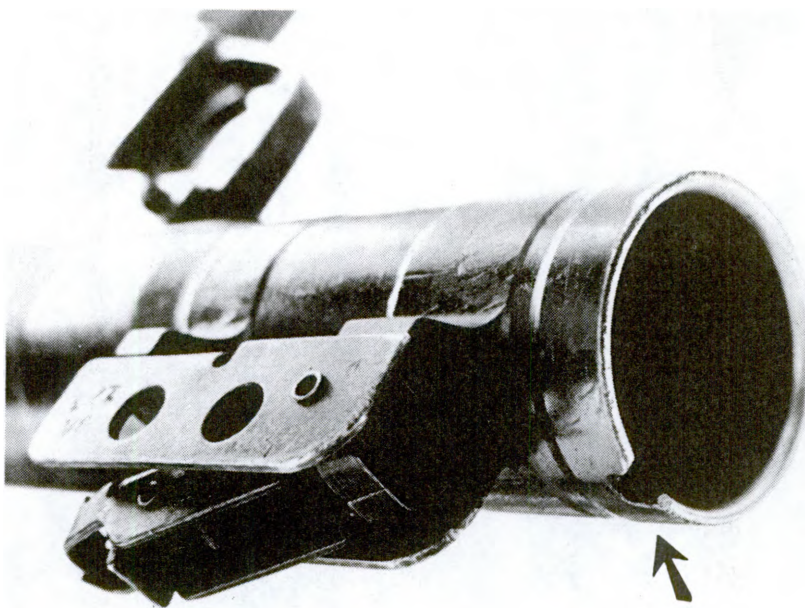


Figure 7. Notch on muzzle.

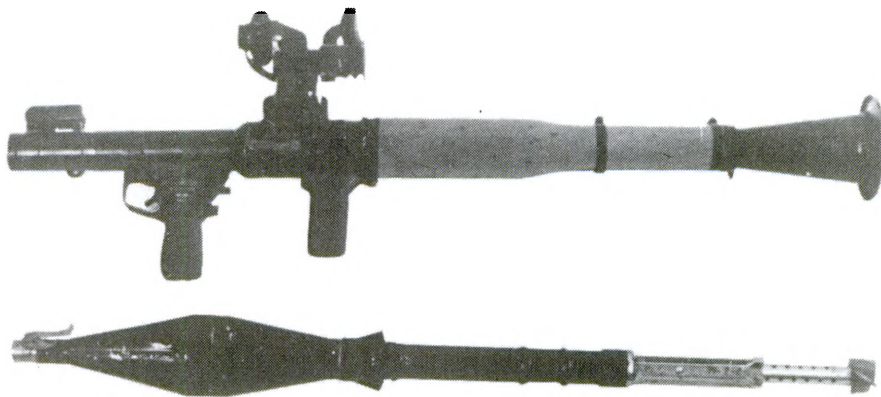
- Metal stud on rocket should aline with notch on muzzle.

REFERENCE:

None

331-915-0814

MAINTAIN A SOVIET RPG 7 AND AMMUNITION



CONDITIONS:

You will be given an RPG 7, two rounds of RPG 7 ammunition, LSA lubricant or weapons lubricating oil, linseed oil, 1/8 inch drift punch or cleaning rod, rifle bore cleaner, paper clip, clean rags, 5-foot long cord, brass hammer, and flat-tip screwdriver.

STANDARDS:

Within 15 minutes clean and oil the RPG 7 and ammunition and perform an operational check.

PERFORMANCE MEASURES:

1. Identify parts (fig. 1).
 - a. Firing and trigger mechanism.
 - b. Cotter pin.

- c. Striker pin assembly.
- d. Striker pin cap.
- e. Striker pin bushing.
- f. Striker pin.
- g. Striker pin spring.
- h. Cover plate and screws.
- i. Heat shields.
- j. Spring rod and spring.
- k. Sear and sear screw.
- l. Striker.
- m. Safety.
- n. Plunger and spring.
- o. Trigger pin and trigger.
- p. Handguards.

2. Disassemble weapon. (Disassembly procedures for the RPG 2 and RPG 7 are the same.)

- a. Clear weapon.
- b. Remove firing mechanism (fig. 2).

(1) Push split pin from left to right with drift punch.

(2) Rotate firing mechanism away from weapon muzzle and lift from barrel.

- c. Remove striker pin assembly (fig. 3).

(1) Remove striker pin with wrench.

(2) Lift striker pin, striker pin spring, and striker pin bushing from recess.

NOTE: If striker pin assembly is removed before firing mechanism, cock striker and place weapon on "SAFE" before removing striker pin cap.

d. Disassemble firing mechanism (fig. 4).

(1) Unscrew the four screws securing the firing mechanism plate and lift plate off firing mechanism body.

(2) Remove the striker (fig. 5).

(a) Cock the striker until the hole in the striker spring rod is visible in the slot at the base of the rod.

(b) Unfold the paper clip and inset the end firmly into the hole, releasing the tension on the striker.

(3) Remove the striker spring and spring rod WITHOUT REMOVING THE PAPER CLIP (fig. 6).

CAUTION. Do not separate striker spring from spring rod or remove the paper clip. Damage to the weapon or personnel may result.

(4) Remove the sear retaining screw and lift the sear out (fig. 7).

(5) Lift the striker from its pivot pin (fig. 8).

(6) Remove the trigger pin and trigger (fig. 9).

a. Punch the trigger pin out with the drift punch.

b. Push the trigger into the firing mechanism body, rotate it upward, and remove it from the body.

(7) Remove the safety (fig. 10).

a. Press the safety to the left and remove from the firing mechanism body.

CAUTION. Plunger, under safety, is under spring tension. Carelessness in removing safety can result in lost parts.

b. Remove plunger and plunger spring from recess (fig. 11).

e. Remove shoulder strap by releasing snap hooks from front end of weapon and unbuckling strap from rear end.

f. Remove wooden heat shield (fig. 1).

(1) Loosen the three clamping collars and slip them to the rear of the heat shield. Do not remove them from the weapon.

(2) Unscrew handguard retaining screw.

(3) Separate and remove the heat shield from the weapon.

3. Clean and oil launcher and trigger mechanism.

a. Moisten rag with bore cleaner and wipe outside of launcher and trigger assembly to remove all foreign matter.

b. Apply light coat of oil to outside of trigger mechanism and launcher.

c. To clean bore, attach rag moistened with bore cleaner to one end of the 5-foot cord. Drop other end of cord through bore and pull rag through. Repeat using clean rags until rag comes through clean.

d. Oil bore by pulling lightly oiled rag through bore, leaving a light coat of oil on the inside surface.

e. Use only linseed oil on wooden handguards.

4. Clean ammunition.

a. Round.

(1) Wipe dirt or grime from round with a dry cloth.

(2) Remove corrosion from round by rubbing corroded area with a cloth moistened with rifle bore cleaner until corrosion is gone.

(3) DO NOT oil round.

b. Propellant.

(1) Brush dirt from propellant with dry cloth.

(2) DO NOT use oil, rifle bore cleaner, or any other wet or oily substance on propellant.

5. Assemble weapon. (Assembly procedures for the RPG 2 and the RPG 7 are the same.)

a. Replace wooden heat shield.

(1) Place shield into position on launcher.

(2) Replace clamping collars in proper position and tighten screws.

(3) Replace handguard retaining screw.

b. Replace shoulder strap.

- (1) Insert strap end through sling bar and buckle it.
- (2) Clip the snap hook to sling swivel at forward end of weapon.

c. Assemble firing mechanism.

- (1) Replace safety.
 - (a) Insert spring and plunger into recess of the body.
 - (b) Compress spring and plunger.
 - (c) Insert safety over the plunger into position.
- (2) Replace the trigger.
 - (a) Place trigger into position.
 - (b) Insert trigger pin.
- (3) Replace the sear into position and replace screw.
- (4) Replace the striker spring and spring rod into recess of firing mechanism body. DO NOT REMOVE PAPER CLIP AT THIS TIME.
- (5) Replace the striker.
 - (a) Place striker onto pivot pin.
 - (b) Cock the striker.
 - (c) Remove the paper clip from the spring rod.
 - (d) Pull the trigger allowing striker to go forward gently.
- (6) Replace firing mechanism plate by replacing the four screws.

d. Replace the striker pin assembly.

- (1) Insert striker pin bushing into recess.
- (2) Replace striker pin spring and striker pin.
- (3) Screw in striker pin cap until tight.

e. Replace firing mechanism.

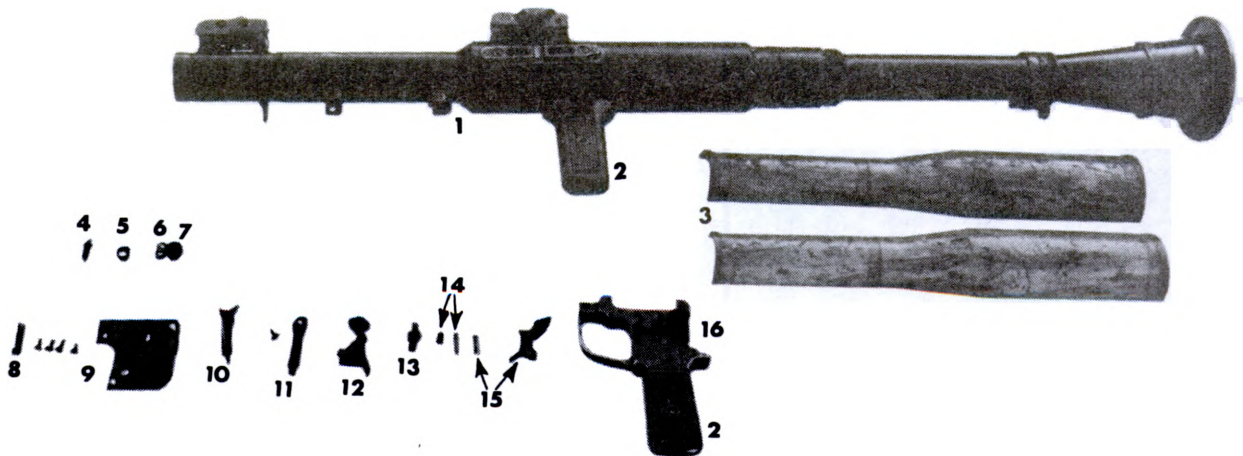
(1) Position firing mechanism by inserting stud into recess at rear and rotating forward.

(2) Insert split pin from right to left.

f. Perform operational check.

(1) Check safety system. Place weapon on "SAFE" and pull trigger; striker should not fall. If the striker falls, recheck the safety for broken or worn parts, or for improper assembly.

(2) Check firing system. Take weapon off "SAFE" and pull the trigger; striker should fall. If the striker does not fall, recheck the firing mechanism for broken or worn parts, or for improper assembly.



- | | |
|-------------------------|--------------------------------|
| 1. Striker pin assembly | 9. Cover plate & screws |
| 2. Hand guards | 10. Spring rod & spring |
| 3. Heat shields | 11. Sear & sear screw |
| 4. Striker pin | 12. Striker |
| 5. Striker pin bushing | 13. Safety |
| 6. Striker pin spring | 14. Plunger & spring |
| 7. Striker pin cap | 15. Trigger pin & trigger |
| 8. Cotter pin | 16. Firing & trigger mechanism |

Figure 1.

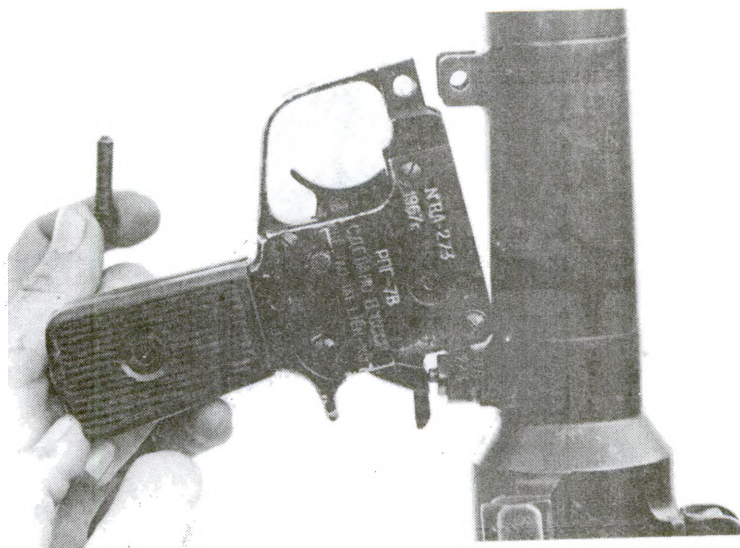
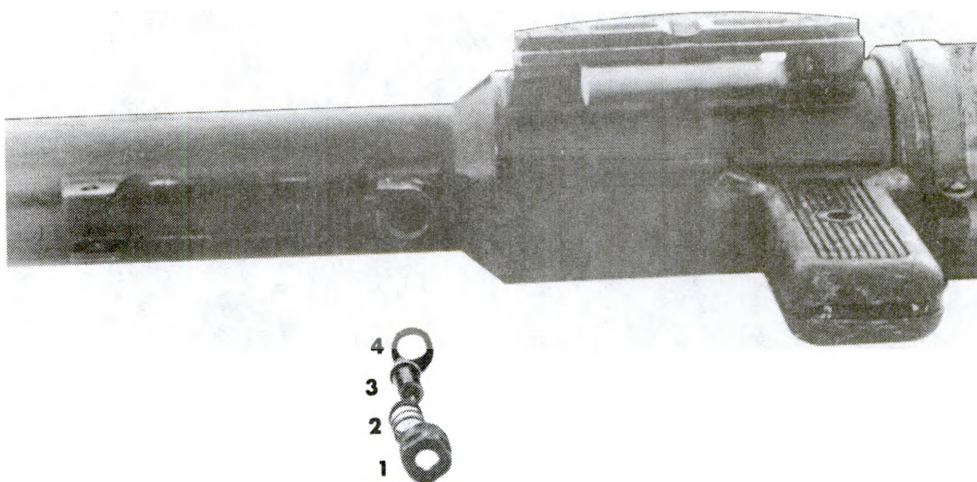


Figure 2



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|-----------------------|------------------------|
| 1. Striker pin cap | 3. Striker pin |
| 2. Striker pin spring | 4. Striker pin bushing |

Figure 3

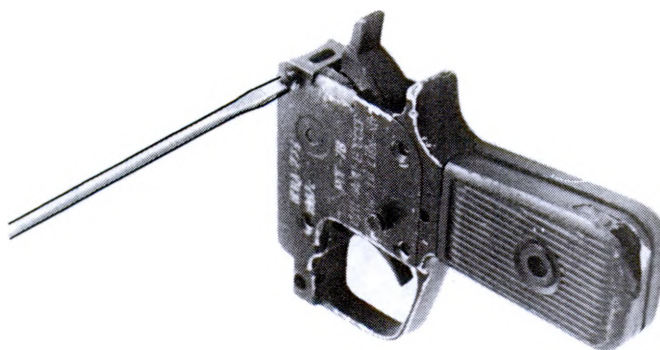


Figure 4

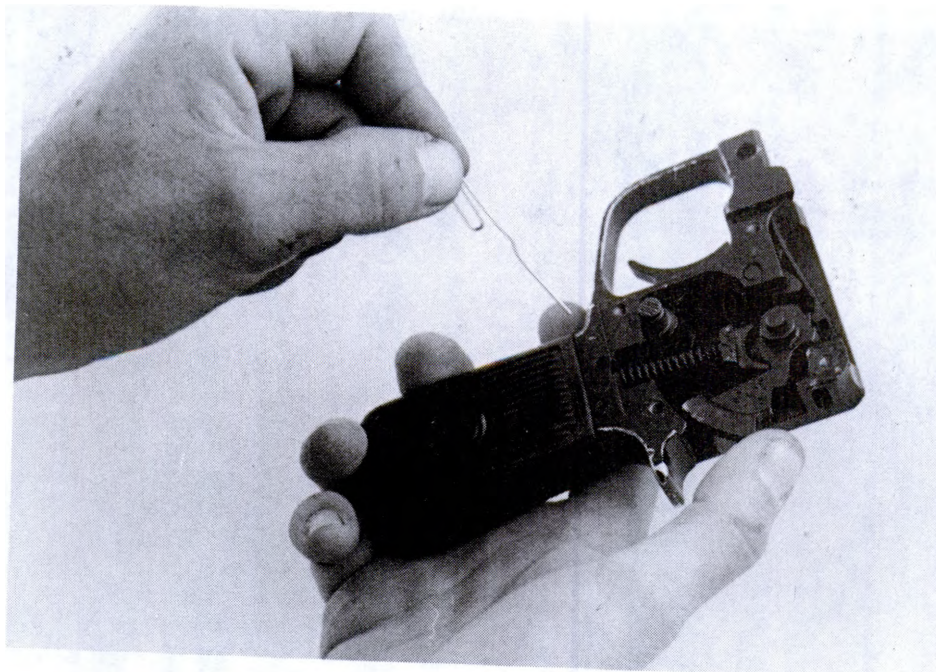
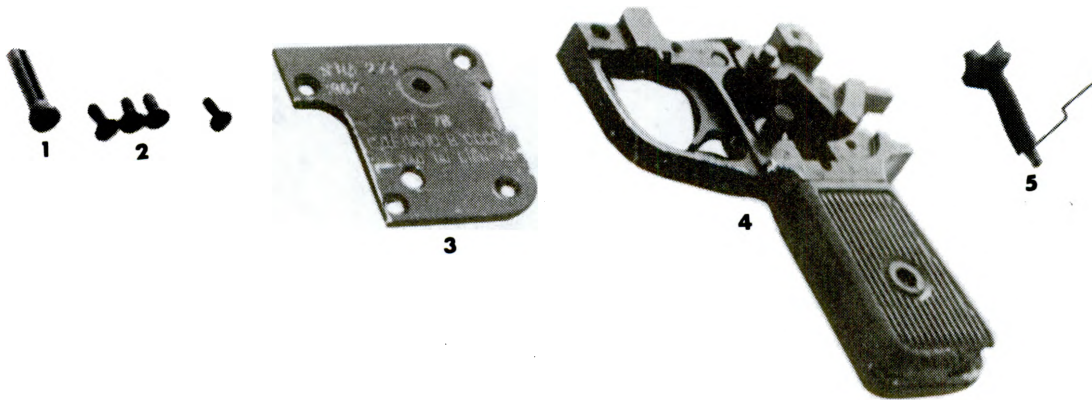


Figure 5



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|---------------------|------------------------|
| 1. Cotter pin | 4. Trigger mechanism |
| 2. Retaining screws | 5. Spring rod & spring |
| 3. Cover plate | |

Figure 6

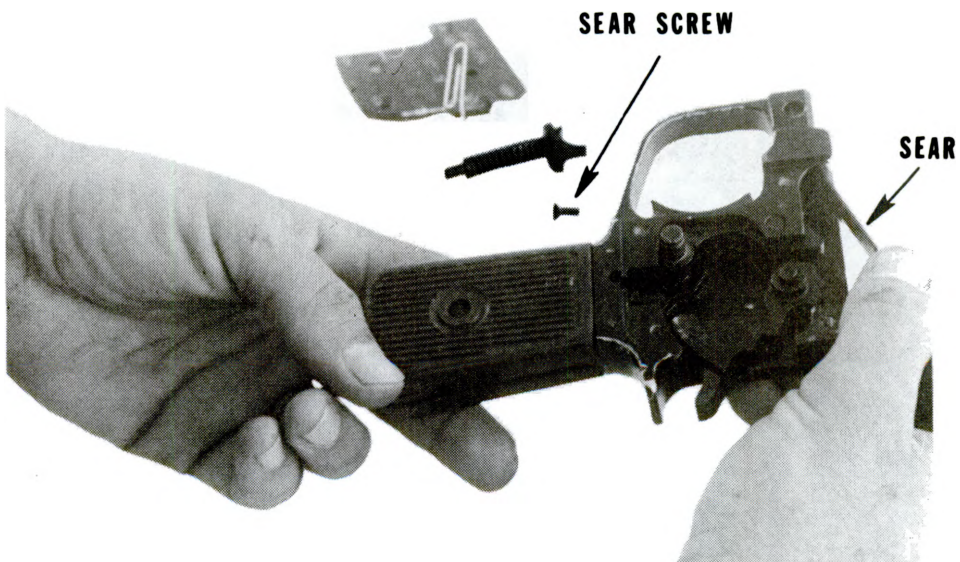


Figure 7

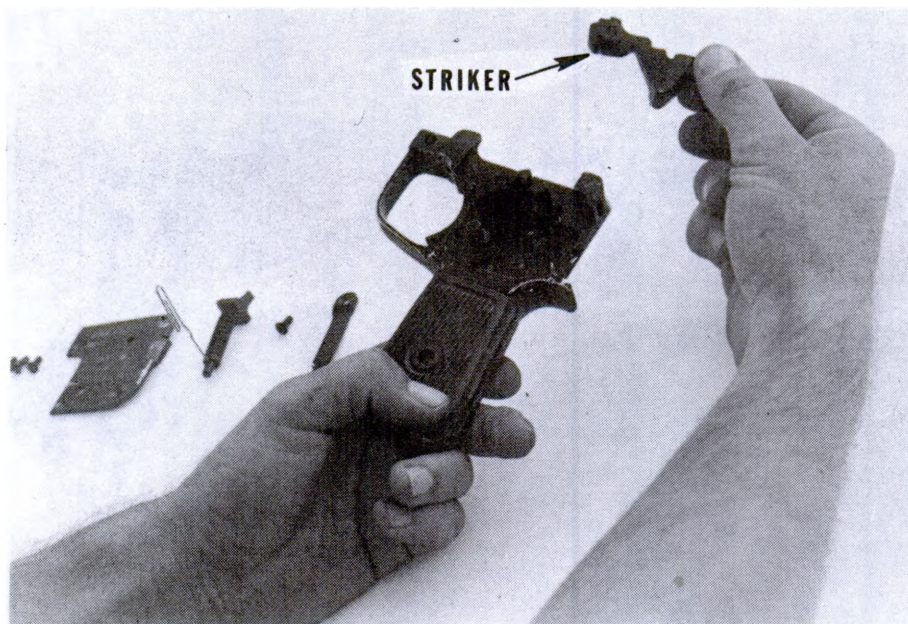


Figure 8

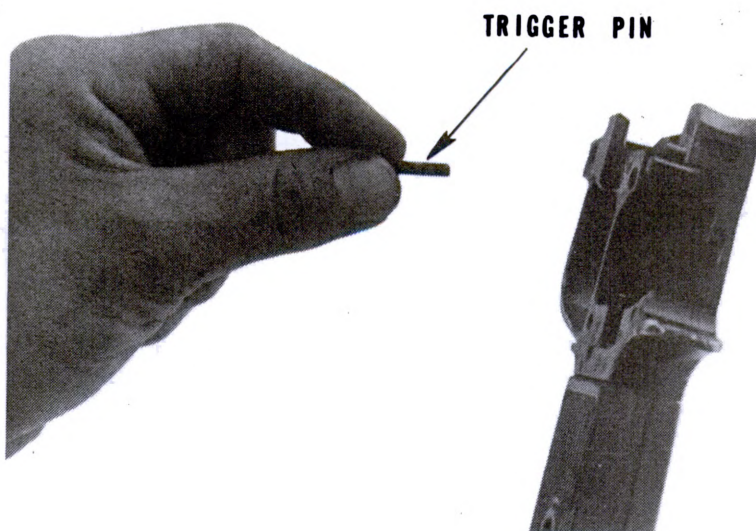


Figure 9

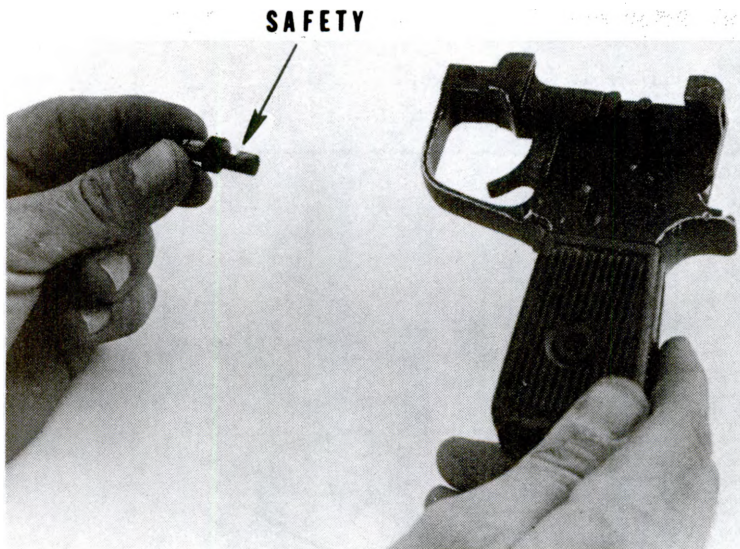
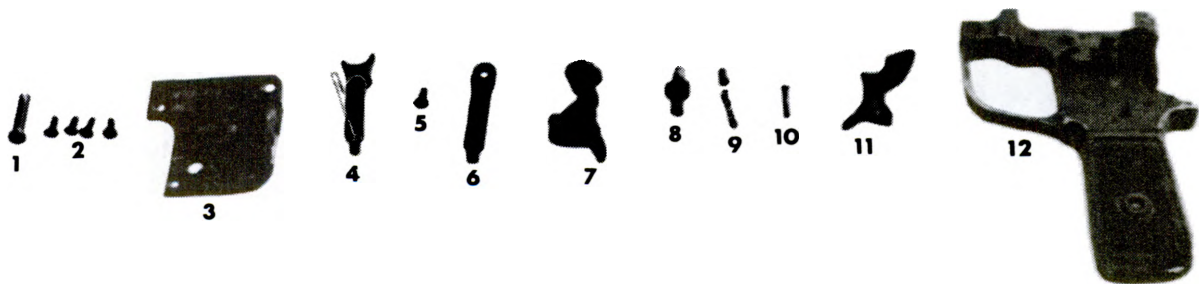


Figure 10



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|------------------------|---------------|--------------------------------|
| 1. Cotter pin | 5. Sear screw | 9. Plunger & spring |
| 2. Retaining screws | 6. Sear | 10. Trigger pin |
| 3. Cover plate | 7. Striker | 11. Trigger |
| 4. Spring rod & spring | 8. Safety | 12. Firing & trigger mechanism |

Figure 11

REFERENCE:

None

331-915-0815

IDENTIFY THE SOVIET SPG 9



CONDITIONS:

You will be given a 57RR and an SPG 9.

STANDARDS:

Within 30 seconds correctly identify the SPG 9.

PERFORMANCE MEASURES:

Distinguish the SPG 9 from the 57RR.* The SPG 9 resembles the 57RR except that:

1. SPG 9 is fired only from a tripod.
2. SPG 9 can be wheel-mounted; the 57RR cannot.
3. The SPG 9 bore is smooth; the 57RR bore is rifled.
4. The SPG 9 (83 inches long) is approximately 2 feet longer than the 57RR (61 inches long).

5. The front sight of the SPG 9 is located on the muzzle. A crossbar is attached under the muzzle.

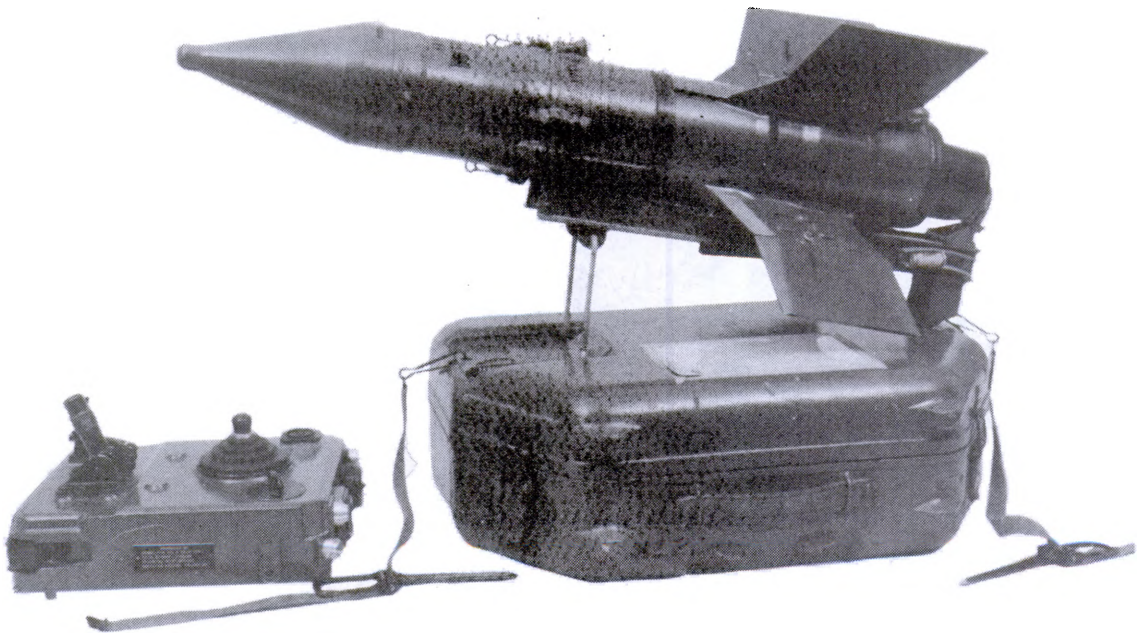
*NOTE: The SPG 9 is more likely to be confused with the 57RR than with other weapons of the same or similar type.

REFERENCE:

Janes Infantry Weapons, 1978, page 615

331-915-0816

PLACE A SOVIET SAGGER MAN-PORTABLE ANTITANK WEAPON INTO OPERATION



CONDITIONS:

You will be given a Sagger man-portable antitank weapon, with all components.

STANDARDS:

Within 8 minutes prepare Sagger for firing.

PERFORMANCE MEASURES:

Prepare SAGGER for firing.

1. The lid of the Sagger's carrying case is used as the launcher. Remove lid from the case and place on desired launch site.

2. Secure with wire or heavy cord attached to stakes driven into the ground.

3. The launch rail is mounted on the lid. Seat the rear of the rail. Slot the rail's front legs into the lid to give a small angle of elevation.

4. The missile is assembled in two parts, the finned motor section and the warhead.

a. Clip warhead to motor body.

NOTE: Aline male/female plug.

b. Place missile on launch rail.

c. Lift stabilizer fins on the motor section until they lock in place.

5. Connect missile to control box with firing mechanism wires.

a. Connect one end of the firing mechanism wire to the rear of the motor section.

b. Connect the other end of the wire to one of the four terminals on the control box. Set the selector switch to the corresponding position.

6. Mount sight on control box.

7. Insert batteries into rear of control box.

8. Test circuit.

a. Set selector switch to "0."

b. Move shipping switch to left.

c. Push circuit switch button, oscillator should read "0."

d. Set selector switch midway between "0" and "1."

e. Push circuit switch again, oscillator should still read "0."

f. Set selector switch to "1."

g. Push circuit switch again, oscillator should read "12."

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h. Repeat procedure, setting selector switch between numbers and on numbers. Readings should be "0" when set between numbers "12" when on a number.

9. Pull up joystick.

10. Assume firing position.

REFERENCE:

None

331-915-0817

PERFORM SAFETY CHECKS ON THE AMERICAN M19 60MM MORTAR



CONDITIONS:

You will be given a mounted M19 60mm mortar and ammunition.

STANDARDS:

You will perform gunner's safety checks and assistant gunner's safety checks on the M19 60mm mortar before and during firing (15 seconds each).

PERFORMANCE MEASURES:

Gunner:

1. Perform before firing safety check.
 - a. Be sure that there is mask and overhead clearance.
 - b. Be sure that mortar is locked to baseplate.
 - c. Be sure that mortar clamp bolt is secure.
 - d. Be sure that locking nut is tight.

e. Be sure that legs are fully spread and locked by the spring latch.

2. Perform safety check during firing.

a. Be sure clamp bolt and locking nut are tight every 10 rounds or every fire mission.

b. Be sure that baseplate and bipod positions are secure and safe for firing.

Assistant Gunner:

1. Perform before firing safety check.

a. Be sure that bore is clean.

b. Be sure that each shell (particularly the bore riding safety) is clean.

c. Be sure that the safety pin and striker spring of each shell are present.

2. Perform safety check during firing.

a. After every fire for effect, swab bore.

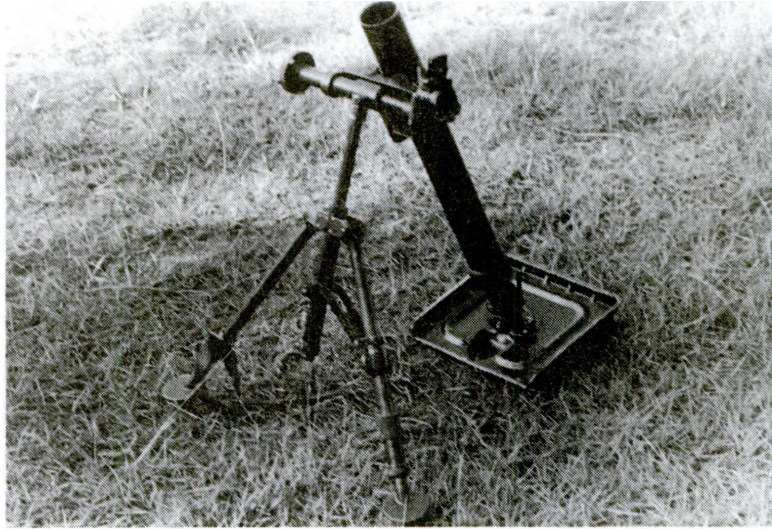
b. After every 10 rounds, swab bore.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 5, para 96

331-915-0818

MOUNT THE AMERICAN M19 60MM MORTAR



CONDITIONS:

You will be given an M19 60mm mortar with baseplate, entrenching tool, M5 mount, M10 aiming post, M4 sight unit, and assistant gunner.

STANDARDS:

Within 10 minutes as a member of the mortar team, mount the M19 60mm mortar.

PERFORMANCE MEASURES:

1. Prepare mortar position.
 - a. Prepare level surface for baseplate.
 - b. Loosen the top few inches of the ground surface with an entrenching tool so that the recoil from the first round will seat the baseplate.
 - c. Drive the baseplate stake into the ground to mark the position of the baseplate.

d. Be sure that the mortar and other metallic equipment are at least 10 meters from the position.

e. Rest the compass on the stake and rotate it until the azimuth announced by the squad leader is laid off on the mil scale.

f. Look through the compass. Direct the assistant gunner to drive the aiming post on this azimuth 25 meters from the baseplate stake.

2. Install the M4 sight.

a. Remove sight from case. Set the elevation scale at 62° or 1100 mils and the deflection scale at zero.

b. Grasp the sight with the left hand, forefinger around the sight head and thumb resting on the cross lever.

c. Press the latch with the thumb of the right hand and guide the sight into the sight slot in the mortar yoke.

d. Release the latch. The dovetailed base should be engaged in the notch in the sight slot.

e. Aline the sight or collimator vertically with left edge of the aiming stake, then center the longitudinal (elevation) lever bubble. Cross-level with the adjusting nut only and lay accurately for direction by operation of the traversing handwheel and the adjusting nut at the same time.

3. Check for proper seating of the M4 sight.

a. Place the left index finger against the sight slot and underneath the body of the sight.

b. Extend the thumb over the cross level and, with the remaining fingers, grasp the under portion of the sight body, attempting to lift the sight out of the slot. When inserted properly, the dovetailed base continues to engage in the sight slot.

NOTE: Check the seating of the sight in the slot every time it is placed on the mortar. Failure to do this may cause a critical loss of time and ammunition during fire for adjustment because true angles of elevation, corresponding to the elevations set on the sight, can only be laid on the mortar when the sight is latched securely.

4. Remove the M4 sight.

a. Place the fingers of the left hand on the sight the same way as for checking the seating of the sight.

b. With the right thumb, press the latch and place the remaining fingers of the right hand on top of the yoke.

c. Apply upward pressure with the left hand and downward pressure with the right hand. Remove the sight.

NOTE: This method causes the least disturbance in the laying of the mortar.

5. Mount the mortar.

a. Kneel on the right knee at the left of baseplate with the mortar resting on the ground and pointing in the general direction of fire.

b. Unbuckle the leather strap and grasp the mortar with the right hand at the midpoint of the barrel. Raise the mortar until the bipod legs can be swung clear of the baseplate with the left hand. Allow the bipod legs to rest on the ground.

c. Reach over the barrel with the right arm, grasp the legs with both hands just above the feet. Pull the legs apart until the spring latch snaps into place.

d. Move the baseplate so the left front corner rests against the baseplate stake and the left edge of the baseplate is alined on the aiming stake.

e. Place the traversing mechanism in a horizontal (east-west) position by moving the guide tube to the right.

f. Turn the adjusting nut until there is a two-finger clearance below the adjusting nut. Tighten the locking nut.

g. Place the bipod legs about 18 inches in front of the baseplate with the legs parallel to and centered on the front flange of the baseplate.

h. Turn the elevating crank 15 times to center the elevating screwnut. Center the traversing mechanism and place the traversing crank in its operative position.

i. Mount the sight.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 2, sec 2, para 13

331-915-0819

PLACE AN AMERICAN M19 60MM MORTAR INTO OPERATION

CONDITIONS:

You will be given an M19 60mm mortar and an M1 baseplate.

STANDARDS:

Within 30 seconds (each) place the M19 60mm mortar into operation using:

1. Kneeling position.
2. Sitting position.

PERFORMANCE MEASURES:

1. Place weapon into operation (kneeling position) (fig. 1).
 - a. Place baseplate on ground, muzzle in direction of fire.
 - b. Place ammunition bag to the right of mortar.
 - c. Set baseplate by jamming into ground.
 - d. Estimate range to target.
 - e. Kneel on right knee and place left foot to the left of baseplate.
 - f. Place hand halfway up barrel to support mortar.
 - g. Check fire selector (set for lever fire).
 - h. Aim mortar by sighting over the edge of the tube, at an estimated elevation, to hit target.
 - i. Give command to "LOAD."
 - j. When assistant gunner has prepared and loaded round, mortar is ready to fire.
2. Place weapon into operation (sitting position) (fig. 2).

- a. Place baseplate on ground, muzzle in direction of fire.
- b. Set baseplate by jamming into ground.
- c. Estimate range to target.
- d. Sit behind mortar, with mortar between legs. Hands are in same position as for kneeling position.
- e. Check fire selector for lever or drop fire.
- f. Aim mortar by sighting over the edge of the tube, at an estimated elevation, to hit target.
- g. When assistant gunner has prepared and loaded round, mortar is ready to fire.
- h. In a sitting position, you may employ either the lever or drop fire technique. When lever fire is used, you may load piece yourself.



Figure 1. Kneeling position.



Figure 2. Sitting position.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 5, sec 2, para 102

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331-915-0820

BORESIGHT THE AMERICAN M19 60MM MORTAR

CONDITIONS:

You will be given a mounted M19 60mm mortar, an M4 sight unit, an M45 boresight, screwdrivers, an M10 aiming stake, and an assistant gunner.

STANDARDS:

Within 5 minutes boresight the M19 60mm mortar so three rounds will fall within 15 meters (diameter) of the target.

PERFORMANCE MEASURES:

1. Install the M45 boresighting device.
 - a. Remove the boresight, clamp assembly, and straps from the carrying case. Grasp the boresight by the body to prevent damaging the telescope.
 - b. Place the ring over the hook and attach the strap snap to the eye provided on the strap shaft.
 - c. Release the catches and reset the straps to the proper length.
 - d. Remove any burrs or imperfections from the seating area of the mortar barrel to insure proper seating of the boresight device. Position the device at the top of the mortar barrel as shown in figure 1.
2. Calibrate the weapon for elevation (fig. 1).
 - a. Mount the mortar on level ground with 0 deflection and an elevation of 45°. Make sure both level vials are centered.
 - b. Install the boresight.
 - c. Center the cross-level vial by rotating the device around the mortar barrel until the bubble is centered. Slight movements may be made by loosening the clamp screw and tapping the body of the boresight. When the cross-level bubble is centered, tighten the clamp screw.

d. Elevate the mortar barrel until the boresight elevation level bubble is centered. The barrel should now be at an elevation of 45° .

e. Turn the elevation knob of the mortar sight until the elevation level on the sight is centered.

f. Recheck all level vials.

g. If necessary, adjust the elevation micrometer of the mortar sight to a reading of 0 by loosening the retaining screws and slipping the micrometer. Check the elevation scale. It should read 45° . If it does not, loosen the retaining screws and slip the scale until the index is opposite the 45° graduation. Retighten all retaining screws. The mortar sight is now calibrated for elevation.

3. Verify accuracy of elevation calibration.

a. Rotate the boresight 3200 mils around the mortar barrel as shown in figure 2.

b. Center the cross-level vial by slight movements of the device.

c. Check the elevation level vial; the bubble should be centered.

NOTE: If it is centered correctly, the elevation mechanism of the boresight is accurate. In verifying the elevation accuracy, make sure the mortar barrel is not disturbed when positioning the boresight on the underneath portion of the barrel.

4. Calibrate the weapon.

a. Install the boresight.

b. The mortar should be laid at a deflection of 0 and an elevation of 45° .

c. Traverse the mortar, cross-leveling simultaneously, until the vertical line of the boresight telescope is laid on an aiming point at least 100 meters distant.

d. Check the level vials on the boresight and the mortar sight. All bubbles must be centered.

e. Aline the vertical line of the mortar sight on the same aiming point by referring the sight (turning the deflection knob).

NOTE: If the deflection micrometer does not read 0, loosen the retaining screw and slip the micrometer until the index is opposite the 0 mil graduation.

f. Tighten the deflection scale screw. The mortar sight is now calibrated for deflection.

5. Verify accuracy of deflection calibration.

a. Install the boresight on the underside of the barrel as shown in Figure 2. Do not disturb the lay of the mortar barrel while centering the cross-level vial bubble on the boresight.

NOTE: The vertical line of the boresight should be on the original aiming point again. If not on the same aiming point, the true axis of the mortar barrel lies halfway between the original aiming point and the point at which the vertical line is now laid. When this situation exists, the mortar sight must be calibrated on a point midway between the original aiming point and the new line of sight since this is the true axis of the mortar barrel. This procedure verifies the accuracy of the device and, at the same time, corrects for cant of the mortar barrel.

6. Remove the M45 boresighting device.

a. Loosen the clamp screw; release the boresight from the mortar.

b. Rotate the elbow telescope until it is parallel to the elevation vial.

c. Release the clamp assembly and strips by removing the ring from the hook and the strap snap from the eye provided on the strap shaft.

d. Stow the clamp assembly and straps in the corner compartment. Place the boresight in the center compartment of the carrying case.

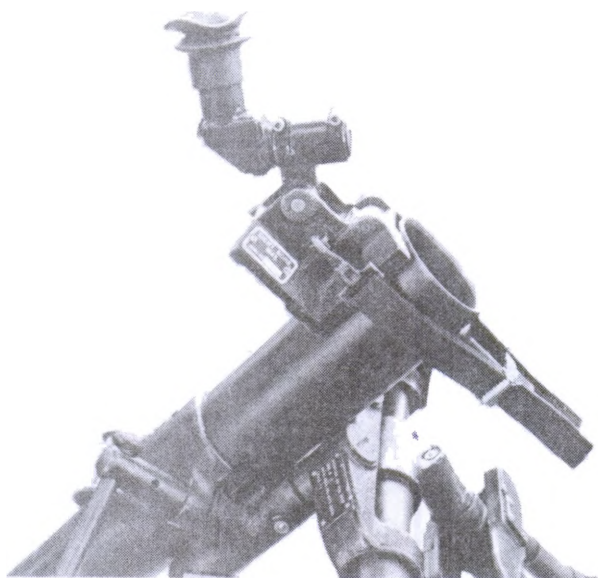


Figure 1. Calibrating weapon for elevation.

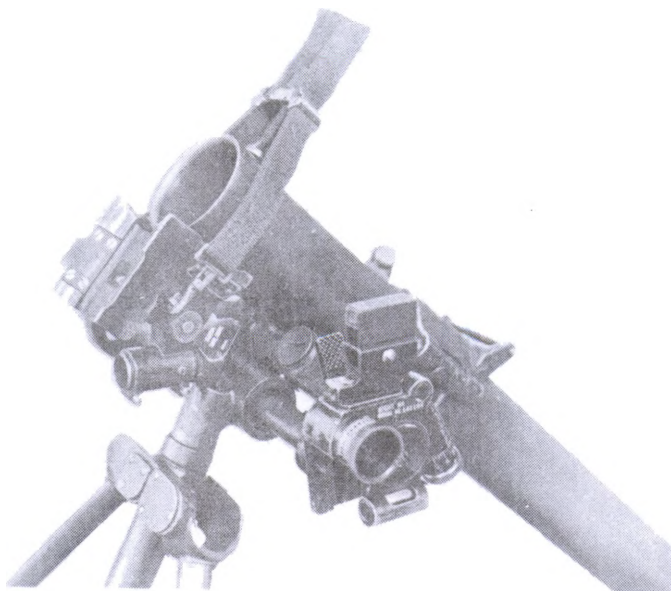


Figure 2. Boresight On underside of barrel.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 2, sec 4, para 35

331-915-0821

LOAD AND FIRE THE AMERICAN M19 60MM MORTAR
USING M2 MOUNT AND M5 BASEPLATE



CONDITIONS:

You will be given an M19 60mm mortar, M5 baseplate, M2 mount, assistant gunner, initial fire command, firing tables, a stationary target at 1,000 meters, and one round each of the following ammunition: M302 (smoke); M50A2 (TP); M69 (training); M49A2 (HE); and illumination (M83A1, M83A2, or M83A3).

STANDARDS:

Within 3 minutes identify and prepare a specified round, load, and fire the M19 60mm mortar.

PERFORMANCE MEASURES:

1. Identify 60mm mortar rounds.

a. M49A2 (HE) - painted olive drab with yellow markings. (NATO rounds are painted and marked the same.)

b. M302 (smoke) - painted gray with a yellow band and markings. (NATO smoke WP is painted light green with light red markings.)

- c. M50A2 (TP) - painted blue with white markings.
 - d. Illumination (M83A1, M83A2, M83A3) - painted gray with white markings. (NATO illumination rounds are painted white with black markings.)
 - e. M69 (training) - painted blue with white markings.
2. Prepare and fire the mortar.
- a. Repeat the initial fire command.
 - b. Set the deflection on the sight.
 - c. Look up the elevation and charge (using the firing table) and announce the correct charge to the assistant gunner.
 - d. Set the elevation on the sight.
 - e. Lay for elevation.
 - f. Lay for direction and cross levels at the same time.
 - g. Remove the sight before firing the first cartridges until the baseplate is firmly seated.
 - h. Check the firing selector. Set on "DROP FIRE."
 - i. Place left hand on the left leg of bipod and right hand around the base cap (to steady and seat the mount) during firing the first three cartridges.
 - j. Give command to fire.
3. Load and assist in firing the mortar.
- a. Repeat gunner's command designating charge.
 - b. Secure an unpacked cartridge and check the bore-riding safety. If safety pin is not present, do not fire the cartridge.
 - c. Hold the cartridge in the vertical (north-south) position, fuse end up.
 - d. Withdraw the safety wire and test the bore-riding safety tension by pressing and releasing the safety pin with the thumb. Do not unseat safety pin.

<p>NOTE: If the bore-riding safety becomes unseated, the cartridge is armed. Such cartridges are placed in a safe location to be destroyed by</p>

supporting maintenance unit personnel. DO NOT FIRE. Armed cartridges, if fired, may detonate in the mortar barrel. Handle them with extreme care because they might be detonated by pressure on the striker.

e. Test for pressure of the fuse striker spring by pressing the striker head with the thumb of the left hand.

f. Remove the necessary number of powder charges to leave the announced charge in place.

g. Place right hand on the right leg of the bipod to steady and seat the mount during the firing of the first three cartridges.

h. Grasp the cartridge with left hand around the gas check band. Insert the cartridge, fuse end up, into the muzzle of the mortar.

i. At gunner's command "FIRE," release the cartridge. Immediately drop your hand back along the tube and turn your face away from the muzzle of the mortar.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 3, sec 1, para 51-55; chap 5, sec 1, para 97

331-915-0822

PERFORM MISFIRE PROCEDURES FOR THE AMERICAN M19 60MM MORTAR

CONDITIONS:

You will be given a mounted M19 60mm mortar and ammunition.

STANDARDS:

Within 5 minutes perform misfire procedures as an M19 60mm mortar gunner/assistant gunner.

PERFORMANCE MEASURES:

Gunner - Perform misfire procedures.

1. Kick the barrel. This may dislodge the cartridge stuck in the barrel.

NOTE: If the cartridge fires, continue mission. If the cartridge does not fire, set the firing selector on "Lever Fire" and trip the lever three times. If the mortar still fails to fire, wait at least 1 minute before removing the cartridge (to avoid accidents caused by a possible delayed action).

2. Test the barrel for heat. If the barrel is cool at the end of 1 minute, remove the cartridge. If the barrel is hot, pour water on the outside of the barrel until it is cool. If no water is available, all personnel will stand clear of the mortar until it is cool.

3. Unlock the mortar from the baseplate. Brace the bipod by placing your left arm in front of the legs and grasping the right leg at the handgrip. Place right hand around the base cap. Keep head and shoulders away from the front of the muzzle.

4. Lift the base of the barrel until the barrel is horizontal (figure 1).

NOTE: Do not lower the base of the mortar below a horizontal position until the cartridge has been removed from the barrel.

Assistant Gunner - Perform misfire procedures.

1. From a kneeling position, place right hand palm up under the barrel and left hand palm down on top of the barrel. Place thumbs alongside the forefingers. Keep hands from in front of the muzzle.

2. After the gunner has placed the barrel in a horizontal position, place the thumb of each hand over the muzzle and stop the cartridge as the point of the fuse reaches the muzzle. Remove the cartridge from the barrel.

NOTE: If safety pin is present, replace safety wire. If safety pin is not present, place the cartridge to one side for disposal by qualified personnel.



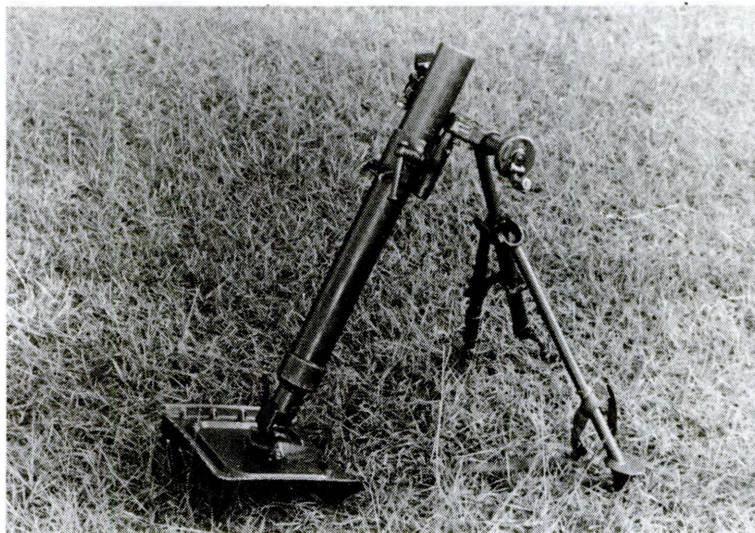
Figure 1

REFERENCE:

FM 23-85, 60mm Mortar, Feb 67, chap 5, sec 1, para 98

331-915-0823

DISMOUNT THE AMERICAN M19 60MM MORTAR



CONDITIONS:

You will be given a mounted M19 60mm mortar and M4 sight unit.

STANDARDS:

Within 1 minute dismount the M19 60mm mortar.

PERFORMANCE MEASURES:

1. Remove and store sight.
2. Dismount the mortar.
 - a. Center the traversing mechanism and return the traversing crank to its inoperative position.
 - b. Turn the elevating crank until the elevating screw nut is returned completely into the guide tube. Loosen the locking nut and move the guide tube over against the left leg. Do not retighten the locking nut.
 - c. Lift the left leg and move it over against the right leg.

d. Grasp the bipod at the midpoint of the legs with the left hand; then reach around the barrel with the right hand and lift the right front edge of the baseplate until the recess fits around the base cap.

e. Position the legs of the bipod under the baseplate and lower the entire mortar to the ground.

f. Fasten the leather strap to secure the bipod and the baseplate to the mortar.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 5, sec 1, para 98

331-915-0824

DISASSEMBLE AND ASSEMBLE THE
AMERICAN M19 60MM MORTAR FIRING MECHANISM



CONDITIONS:

You will be given an M19 60mm mortar tube with firing mechanism attached and a flathead screwdriver.

STANDARDS:

Within 5 minutes correctly disassemble and assemble the M19 60mm mortar firing mechanism (fig. 1).

PERFORMANCE MEASURES:

1. Remove firing mechanism from mortar.
 - a. Remove baseplate.
 - b. Remove lock screw from firing mechanism (fig. 2).
 - c. Unscrew firing mechanism from base cap (fig. 3).
2. Disassemble firing mechanism.

a. Remove firing pin striker, firing spring, and firing spring stop (fig. 4).

b. Remove housing cover pin and housing cover (fig. 5).

c. Push in on selector plunger. Remove housing cover, firing selector, selector plunger and spring, firing lever, tripper, and firing lever spring and sleeve.

d. Remove housing adaptor (fig. 6).

e. Remove firing pin assembly (fig 7).

f. Remove stop washer and retracting spring (fig. 8).

3. Assemble firing mechanism.

a. Replace stop washer and retracting spring fire pin.

b. Replace firing pin assembly.

c. Replace housing adaptor.

d. Replace firing lever spring and sleeve, tripper, and firing lever.

e. Replace selector plunger and spring.

f. Replace firing selector.

g. Replace housing cover and pin.

h. Replace firing pin striker.

i. Replace firing spring and spring stop on striker.

4. Install firing mechanism on mortar.

a. Screw firing mechanism into base cap.

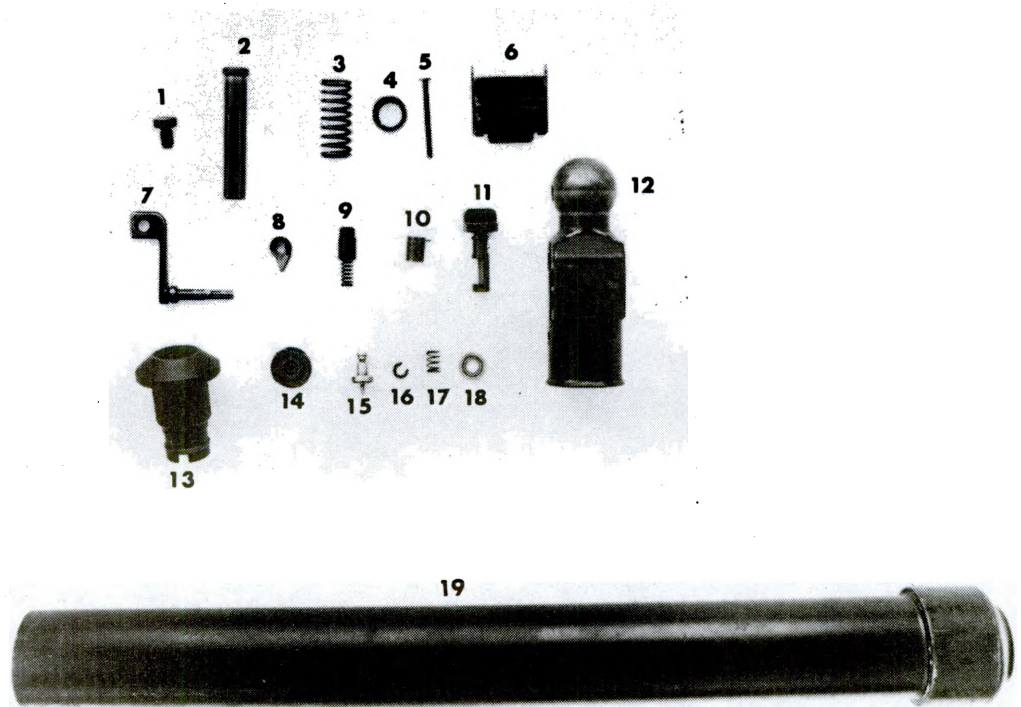
b. Screw lock screw into firing mechanism.

c. Perform operational check.

(1) Set the firing selector for lever fire.

(2) Trip the firing lever. The striker should move forward striking the firing pin, making a distinct metallic click.

d. Replace baseplate.



- | | |
|------------------------------|-----------------------|
| 1. Lock screw | 11. Firing selector |
| 2. Firing pin striker | 12. Firing mechanism |
| 3. Firing spring | 13. Housing adapter |
| 4. Firing spring stop | 14. Bushing |
| 5. Housing cover spring | 15. Firing pin |
| 6. Housing cover | 16. Retaining clip |
| 7. Firing lever | 17. Retracting spring |
| 8. Tripper | 18. Stop washer |
| 9. Selector plunger & spring | 19. Tube |
| 10. Firing lever & spring | |

Figure 1. Parts list.

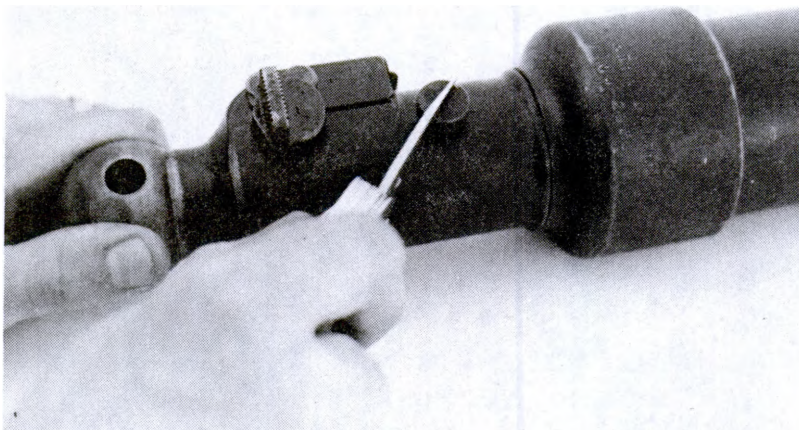


Figure 2. Removing lock screw from firing mechanism.



Figure 3. Unscrewing firing mechanism from base cap.

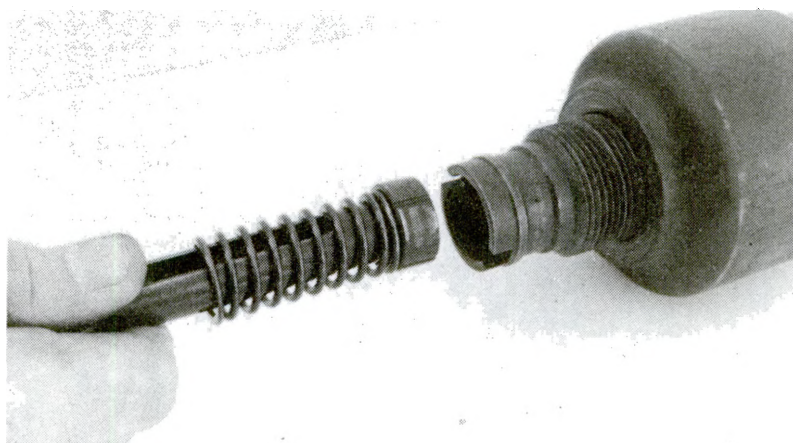


Figure 4. Removing firing pin striker, firing spring, and firing spring stop.



Figure 5. Removing housing cover pin and housing cover.

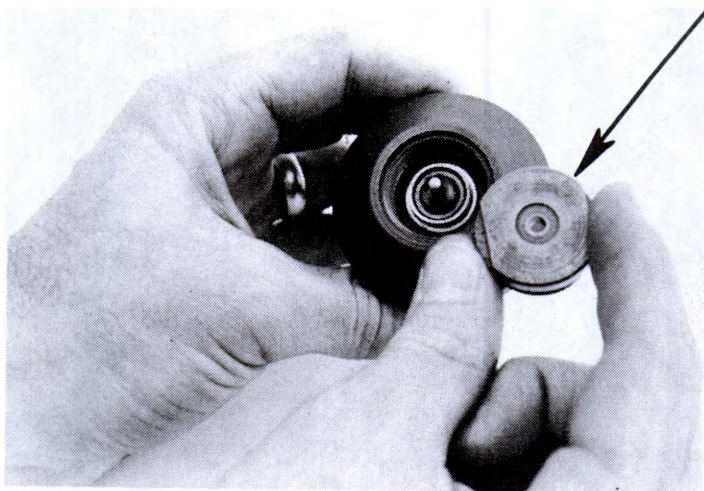


Figure 6. Removing housing adapter.

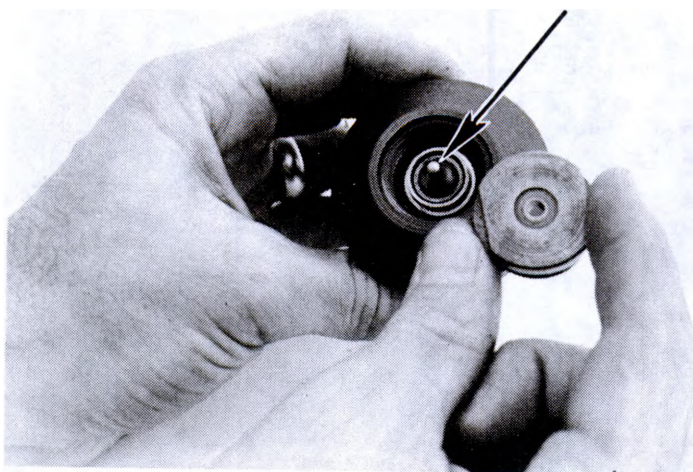


Figure 7. Removing firing pin assembly.

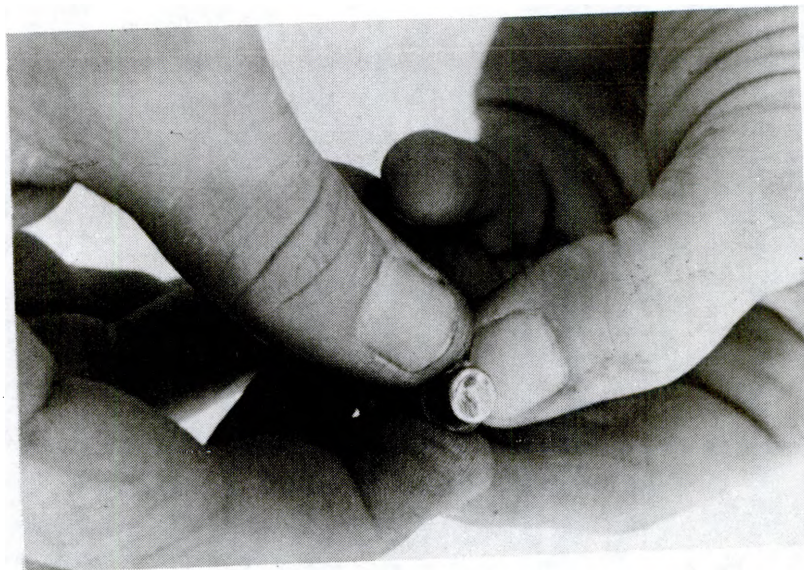


Figure 8. Removing stop washer and retracting spring.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 2, sec 2, para 9-10

331-915-0825

MAINTAIN AN AMERICAN M19 60MM MORTAR AND M4 SIGHT

CONDITIONS:

You will be given an M19 60mm mortar, M4 sight unit, M1 baseplate, M2 mount, flathead screwdriver, lens cleaning tissue, lens cleaning soap, and light preservation lubricating oil (PL). You will also be given SP lubricating oil, clean cotton rags, an M6 brush, and an M9 cleaning staff oiler.

STANDARDS:

Within 15 minutes disassemble, clean, and assemble the M19 60mm mortar firing mechanism. Oil all parts which require oiling.

PERFORMANCE MEASURES:

1. Disassemble mortar firing mechanism.
2. Clean and oil firing mechanism.
 - a. Disassemble firing mechanism.
 - b. Clean all parts thoroughly with cotton rags, paying particular attention to holes, screw threads, and slots of the housing.
 - c. Saturate clean rag with special preservative oil and apply a thin coat of oil to all parts of the firing mechanism.
3. Clean and oil mortar bore.
 - a. Attach cotton rag to cleaning staff. Insert into muzzle end of bore and move staff forward and backward several times. Replace rag with a clean one.
 - b. Insert rag into bore again and push staff forward until rag touches bottom of bore. Twist staff to right to remove accumulated dust, dirt, and thickened oil. Repeat until rag comes out clean.
 - c. Saturate clean rag with lubricating oil and push through bore.
4. Clean and oil baseplate and bipod.

a. Clean all screw threads and crevices with M6 brush or a small stick wrapped with cotton rag.

b. Rub metal surfaces with a dry cloth to remove moisture, perspiration, and dirt.

c. Maintain protective film of oil on all moving parts and polished surfaces by wiping with a clean cloth dampened with preservative lubricating oil.

d. Use oiler with adaptor to apply lubricating oil to the five flush-type fittings on the bipod; on the left leg clevis, traversing bearing, sight slot on the yoke, and the left and right shock absorbers.

5. Clean and oil M4 sight unit.

a. Use only authorized lens cleaning tissue and soap to clean sight unit optical parts. Never use ordinary polishing liquids, paste, or abrasives.

b. Keep lens clean and dry by wiping with lens cleaning tissue. Remove grease or oil from lens only with authorized lens cleaning soap.

c. Oil moving sight unit parts with light preservative lubricating oil (PL) and wipe off excessive lubricant to prevent accumulation of dust and grit.

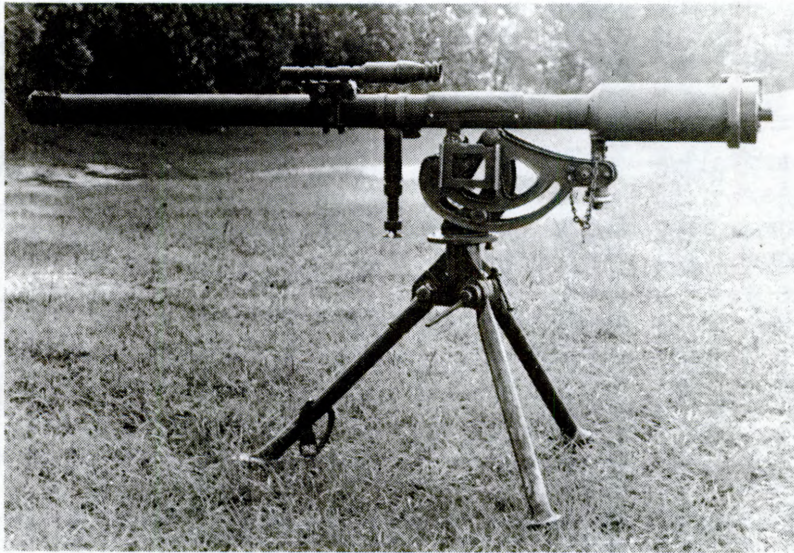
6. Reassemble mortar firing mechanism.

REFERENCE:

FM 23-85, 60mm Mortar M19, Feb 67, chap 2, sec 3, para 20-d and sec 4, para 34

331-915-0826

IDENTIFY, DISASSEMBLE, MAINTAIN, AND ASSEMBLE
THE AMERICAN M18A1 57RR



CONDITIONS:

You will be given an M18A1 57RR, weapons lubricating oil, clean rags, rifle bore cleaner, crocus cloth, and bore brush.

STANDARDS:

Within 15 minutes:

1. Disassemble and inspect the M18A1 for burrs, corrosion, cracks, and general wear (fig. 1).
2. Clean and lubricate the breech mechanism group.

3. Assemble the M18A1 correctly.

PERFORMANCE MEASURES:

1. Remove the breech mechanism group.

a. From the right side of the weapon, grasp the breechblock handle with the left hand, palm facing the rifle muzzle. Rotate the breechblock counterclockwise to disengage the lugs of the breechblock and chamber. Swing the breech group to the right rearmost position. Hold the chamber handle with right hand to steady weapon while opening the breech.

NOTE: Do not allow any portion of the hand, arm, or body to extend beyond the rear of the breechblock when a round of ammunition is in the chamber. Hands and arms should always be above and to the right of the weapon when opening and closing the breech.

b. Unscrew breechblock handle and chamber handle.

c. Turn safety lever assembly counterclockwise until clear of safety lever retaining pin. Lift safety lever from the breechblock carrier pivot.

d. Push safety spring toward chamber; hold in this position. Using the screwdriver end of the breechblock handle, push breechblock carrier pivot up and out of the carrier hinge bracket of the chamber. Support the breech mechanism group when removing the pivot.

e. Withdraw breech mechanism group from carrier hinge bracket.

2. Disassemble the breech mechanism group.

a. Using the screwdriver end of the breechblock handle, remove the breechblock detent screw from the breech mechanism group.

b. Unscrew the three breechblock operating lever screws and raise the breechblock operating lever high enough to lift breechblock detent from under the lever. Lower the breechblock operating lever back in place and unhook detent from the 1/8 x 9/16 straight pin. Secure breechblock operating lever with the three breechblock operating lever screws.

c. Holding breechblock in left hand, face down, rotate breechblock carrier assembly counterclockwise until it locks. Using screwdriver end of breechblock handle, push down on the sear lever to move the striker assembly and relieve pressure on the compressed firing spring (fig. 2).

NOTE: The breechblock carrier assembly may be held down by hand instead of the breechblock cover or breechblock operating lever. However, the carrier must be held down securely when the sear is released from the striker assembly.

d. Remove the breechblock operating lever screws, the three lockwashers, the breechblock operating lever, and the breechblock carrier group from the breechblock.

e. Using your thumb, push down on the sear lever to relieve pressure on the striker assembly and firing spring. Slide the striker assembly and firing spring out of the housing of the breechblock carrier assembly.

f. Remove the sear plug from the breechblock carrier and take the sear spring out of the opening.

g. Remove the sear lever axis pin from the breechblock carrier and take the sear lever out of the front of the carrier. Slide the sear out of the carrier from the right side.

h. Unscrew the extractor retaining plug from the rear of the breechblock and take the extractor spring and extractor assembly out of the seat in the breechblock.

i. Remove the throat block screws and lift the top and bottom throat blocks from the face of the breechblock.

j. Remove the three throat ring retaining screws which hold the throat ring to the breechblock. Take the throat ring out of its seat in the face of the breechblock (fig. 3).

3. Inspect the breech mechanism group.

a. Examine interrupted lugs on breechblock for burrs and corrosion. If burrs are present, notify ordnance maintenance personnel. Remove corrosion with crocus cloth.

NOTE: Any burrs or corrosion on bearing surfaces which cannot be removed with crocus cloth must be referred to ordnance maintenance personnel.

b. Examine striker assembly for burrs, wear, or corrosion. Replace firing pin if worn or broken. Replace spring pin if it fails to hold firing pin securely.

c. Check sear for worn or mutilated surfaces. If the lips or shoulders which engage the striker assembly exhibit any significant bevel, the sear should be replaced. Since the firing spring acting against the striker assembly is much stronger than the sear spring, any

significant bevel of the engaging surfaces of the sear and striker assembly may allow the striker assembly to cam the sear out of engagement and fire the weapon prematurely.

d. Inspect the firing spring, sear spring, and extractor spring by comparing the springs with the spare parts. Replace any spring which is weak, badly worn, misformed, or broken.

e. Examine the threads of the extractor plug and sear plug. If threads are worn or stripped, replace plug.

f. Replace the extractor assembly if bent or broken or if the claw end is worn to the extent it will no longer engage the cartridge case securely.

g. Replace the sear lever axis pin if badly scored, worn, or if threaded end is stripped.

h. Replace the breechblock carrier pivot if bent, cracked, or broken.

i. Replace all screws and lockwashers that are bent, corroded, stripped, or have badly chewed heads.

j. If the rifle is not balanced, replace the top and bottom throat blocks and the throat ring.

4. Clean and lubricate breech mechanism group.

a. Clean all parts of the breech mechanism thoroughly with rifle bore cleaner.

b. Use bore brush to remove all residue from the cocking cam surfaces of the breechblock.

NOTE: The entire disassembly/inspection/cleaning procedure should be repeated, without lubrication, for 3 consecutive days after firing, or until there is no further evidence of sweating inside the rifle. On the fourth day after firing or on the day after the last evidence of sweating was found, repeat steps 1-5. Then wipe all parts dry and lubricate all parts with a thin coat of lubricating oil.

5. Reassemble breech mechanism group.

a. Place the throat ring in its recess in the face of the breechblock, alining the hole for the extractor assembly with the extractor recess in the breechblock. Secure the ring with three throat ring retaining screws. NOTE: Do not tighten screws yet.

b. Place top and bottom throat blocks on breechblock and secure with throat block screws. The bottom throat block, which has the extractor relief cut on its under side, should be positioned on the extractor side of the breechblock.

c. Tighten throat block screws and back off one quarter to one-half turn. (If this is not done, the screws will be extremely difficult to remove after firing, and the breechblock will be difficult to open after firing a round since gas pressure between the throat blocks and the throat ring moves the throat blocks against the wall of the chamber.)

d. Insert the extractor assembly, claw end first, into the extractor recess at the rear of the breechblock. Aline the guide pin on the extractor assembly with the groove in the extractor recess. Insert the extractor spring into the recess and screw the extractor retaining plug into the extractor recess, flush with the breechblock.

WARNING. Do not confuse the sear plug and the extractor retaining plug. Although they have the same thread and diameter, the sear plug has a notch on the nonthreaded end; the notch on the extractor retaining plug is on the threaded end.

e. With the extractor assembly installed, tighten the throat ring retaining screws. Be sure the throat ring and extractor assembly do not bind.

f. Insert the sear into its bore in the breechblock carrier assembly so that the end with the milled shoulders projects into the striker and firing spring housing of the carrier.

g. Position the forked side of the sear lever so that it faces the slotted corner of the carrier housing or examine the narrow milled shoulders of the sear and face the less worn shoulder toward the cavity of the carrier housing. Insert the sear lever into the breechblock carrier assembly and engage the forked end of the sear lever with the sear lever notch in the sear.

h. Aline the hole in the sear lever with the sear lever axis pin hole in the breechblock carrier assembly. Insert the sear lever axis pin into the alined holes. Screw in place.

i. Insert the sear spring and sear plug into the end of the sear bore of the carrier assembly. Tighten the sear plug. Remember, don't confuse the extractor retaining plug and the sear plug.

j. Using your thumb, press down on the sear lever to withdraw the sear from the opening in the striker housing of the breechblock carrier assembly. Insert the firing spring and striker assembly and release the sear lever to hold the spring and striker assembly in place.

k. Engage the hooked end of the breechblock detent on the straight pin of the breechblock carrier assembly. Swing the detent up and over the carrier assembly and hold in place with the breechblock detent screw.

l. Place the assembled breechblock carrier group over the breechblock so the V-shaped cam surfaces on the striker drop into the V-shaped notches in the breechblock. The hinge portion of the carrier assembly will be above the extractor retaining plug.

m. Place the breechblock operating lever over the circular portion of the breechblock carrier assembly. Aline the detent holes in the underside of the lever with the breechblock detent. Aline the three screw holes in the lever with the corresponding holes of the breechblock. Attach the lever to the breechblock with three breechblock operating lever screws and three 1/4-inch lockwashers.

n. Support the breechblock with your left hand and rotate the breechblock carrier assembly clockwise. Cock the firing mechanism and place the breech mechanism group in the unlocked position for installation.

6. Install the breech mechanism group on the rifle.

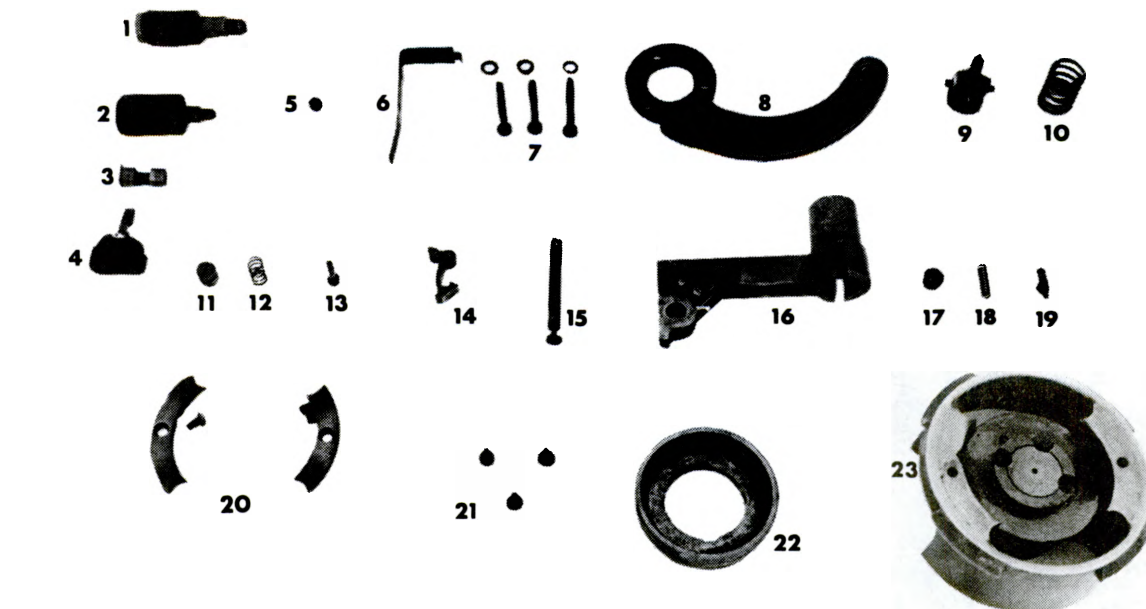
a. Insert the breechblock carrier assembly into the carrier hinge bracket on the chamber. Aline the pivot holes in the carrier and bracket. Insert the breechblock carrier pivot until it contacts the safety spring.

b. Pull the safety spring toward the chamber. Hold safety spring and push breechblock carrier pivot completely into the carrier hinge bracket. Make sure the slot in the pivot flange straddles the pin in the bracket. Release safety spring.

c. With breech open, insert safety lever assembly in breechblock carrier pivot. Turn lever assembly clockwise as far as possible. Be sure the flange of the lever is held by the head of the safety lever retaining pin on the hinge bracket.

d. Install breechblock handle.

e. Close the breech.



- | | |
|---------------------------------------|----------------------------------|
| 1. Breechblock handle | 13. Sear lever axis pin |
| 2. Chamber handle | 14. Sear lever |
| 3. Safety retaining pin | 15. Sear |
| 4. Safety lever | 16. Breechblock carrier assembly |
| 5. Detent screw | 17. Extractor retaining plug |
| 6. Detent | 18. Extractor spring |
| 7. Breechblock operating lever screws | 19. Extractor |
| 8. Breechblock operating lever | 20. Throat blocks |
| 9. Striker assembly | 21. Throat ring retaining screws |
| 10. Firing spring | 22. Throat ring |
| 11. Sear plug | 23. Breechblock |
| 12. Sear spring | |

Figure 1

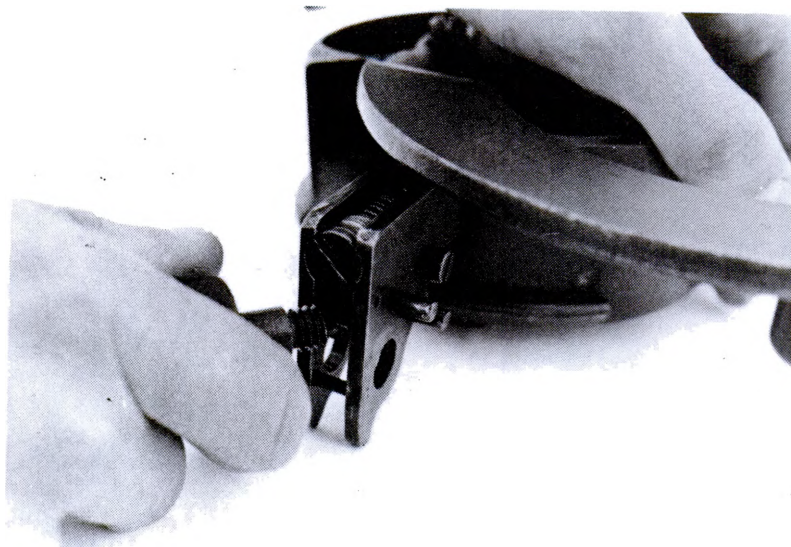


Figure 2

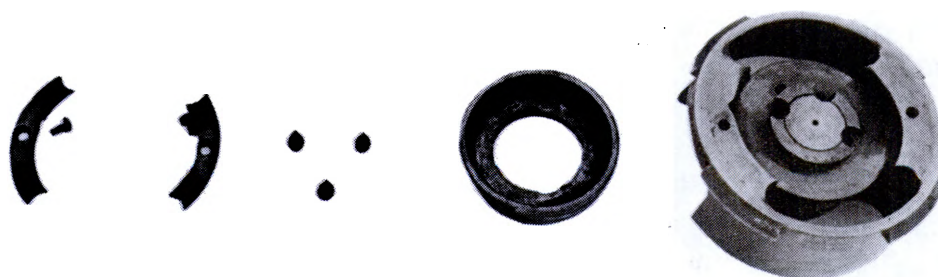


Figure 3

REFERENCE:

NONE

331-915-0827

PREPARE A RANGE CARD FOR THE AMERICAN M18A1 57RR

CONDITIONS:

You will be given a 57mm RR in a defensive firing position, a designated sector of fire, paper, pencil, a 1:50,000 scale map, and a lensatic compass.

STANDARDS:

Within 15 minutes from the firing position, correctly prepare a range card.

PERFORMANCE MEASURES:

The range cards for the 57mm RR are prepared the same way as range cards for the RPG 2.

REFERENCE:

FM 23-82, 106mm Recoilless Rifle M40A2, Jul 73

331-915-0828

IDENTIFY M18A1 57RR AMMUNITION FOR FIRING

CONDITIONS:

You will be given one round each M306A1 (HE) (high explosive); M306A1 (TP) (training practice); M307A1 (HE, AT) (high explosive, antitank); M308A1 (WP) (white phosphorus); T2535 (cannister); and an initial fire command.

STANDARDS:

Within 1 minute select and prepare correct round for firing.

PERFORMANCE MEASURES:

1. Identify ammunition by classification.

- a. M306A1 (HE): Projectile painted olive drab with yellow markings. Marking "COMP B" or "TNT."
- b. M307A1 (HE, AT): Projectile painted olive drab with yellow markings. Marked "HEAT."
- c. M306A1 (TP): Projectile painted blue with white markings.
- d. M308A1 (WP): Projectile painted gray with yellow markings.
- e. T2535 (Canister): Canister painted black with white markings.

REFERENCE:

NONE

331-915-0829

PERFORM SAFETY CHECK ON THE
AMERICAN M18A1 57RR AND AMMUNITION



CONDITIONS:

You will be given an M18A1 57RR mounted on an M74 or M1917A2 tripod and four rounds of 57RR ammunition.

STANDARDS:

Within 3 minutes perform safety check on an M18A1 57RR.

PERFORMANCE MEASURES:

1. Clear rear danger area.
2. Inspect weapon.
 - a. Check general condition and appearance of weapon.
 - b. Check condition of weldments, rivets, brackets, bolts, etc., for breaks and cracks. Check for loose, broken, stripped, or missing bolts, nuts, screws, and cotter pin. Inspect hinge, clamps, latches, pins, and other moving parts for proper lubrication and evidence of rust. Check spare parts, tools, and equipment.

3. Inspect ammunition. WARNING: Explosive ammunition or components containing explosive must be handled with appropriate care at all times.

- a. Inspect packings to see that the packing is not broken or damaged.
- b. Inspect the perforated plastic-lined or paper-lined steel cartridge case for holes.
- c. Reject round if plastic is punctured.

REFERENCE:

NONE

331-915-0830

PREPARE THE AMERICAN M18A1 57RR FOR FIRING



CONDITIONS:

You will be given an M18A1 57RR, M74 or M1917A1 tripod mount, and M86C or M86F telescope.

STANDARDS:

Within 5 minutes prepare the weapon for firing from the tripod.

PERFORMANCE MEASURES:

1. Emplace tripod mount.

a. Place tripod on ground, rear leg to rear; unfasten tripod strap; and loosen the two front leg jamming handles.

b. Grasping the rear leg with right hand and pintle support with left hand, swing front legs out to their approximate emplaced position.

c. Support the mount by holding the pintle. Aline the rear leg in the direction of fire.

d. Adjust tripod to ground so that traversing dial is level. Fix position of front legs by tightening front leg jamming handles. If front leg adjustments do not level traversing dial, loosen rear leg jamming nut, adjust rear leg until traversing dial is level, and tighten rear leg jamming nut.

e. Loosen cradle pintle clamping screw and swing cradle to place elevating/traversing mechanism assembly directly over rear leg of mount. Retighten cradle pintle clamping screw.

2. Attach rifle to tripod mount.

a. Raise pintle lock release cam.

b. Remove elevating screw mounting pin from yoke of elevating screw.

c. Position rifle over mount so that pintle is over pintle support and chamber fulcrum aligns with yoke of elevating screw.

d. Lower pintle into pintle support.

e. Lower chamber fulcrum over yoke of elevating screw. Align holes in fulcrum and yoke. Insert elevating screw mounting pin.

f. Push pintle lock release cam down to secure pintle to mount.

3. Install sighting and fire control instrument. NOTE: M86F and M86C telescopes differ because the M86F sight has stadia lines and the M86C sight does not.

a. Inspect instrument.

(1) Inspect for completeness and general appearance. Reject instruments with rust, corrosion, nicks, burrs, or other flaws, chipped or flaking paint, or bare spots on painted surfaces.

(2) Inspect the rubber eyeshield for cracks, fungus growth, dirt, and signs of wear.

(3) Looking through the telescope, inspect for dirt, smears, scratches, digs, condensation, fungus growths, or chips that obstruct your view. Look through other end of telescope and repeat inspection.

(4) Visually examine the reticle illuminating window to be sure that it is not broken and is securely sealed and fastened in the body of the telescope.

(5) Replace defective parts or entire telescope as required.

b. Prepare weapon for mounting the sighting and fire control instrument.

(1) Lower the spring-loaded front sight.

(2) Lower the spring-loaded rear sight by loosening the peep sight clamping screw, depressing the sight, and retightening the clamping screw.

c. Mount sighting and fire control instrument on weapon.

(1) Open the telescope bracket socket by rotating the telescope holder cam. Make sure that the cam does not protrude into the socket.

(2) Remove the telescope from carrying case and store case in ammo can. Hold the telescope above, and at an angle to, the mount, objective end frontward and down.

(3) Slip telescope lug between the mounting lugs of telescope lug holder.

WARNING. Do not twist or move telescope sideways when positioned or you may break the telescope lug, the telescope lug holder, or both.

(4) With an even, downward motion, fit the front projection on the telescope lug under the mating projection on the telescope lug holder; at the same time, insert the telescope bracket into the telescope bracket socket.

NOTE: If the bracket does not seat easily, either the telescope cam holder is not fully open or the telescope lug and telescope lug holder are not properly engaged. Check both.

WARNING. Do not bump the telescope with the heel of your hand or try to force it into position. You can break the lug or lug holder, or both.

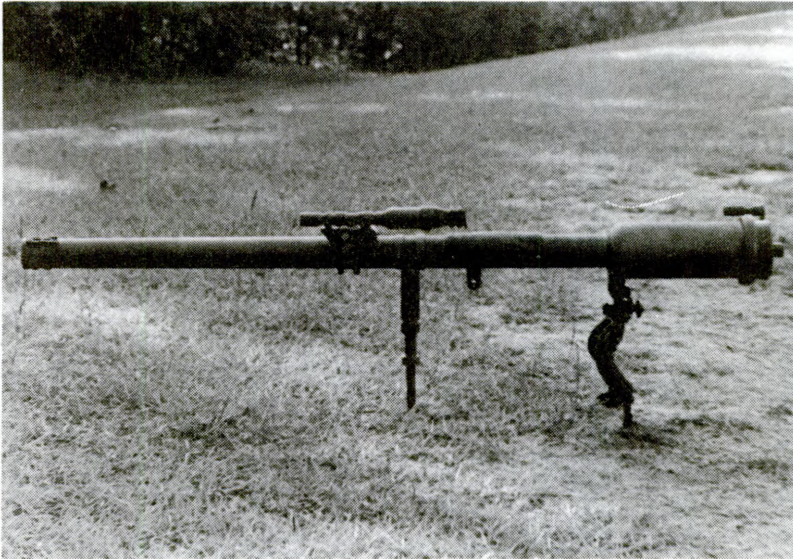
(5) Turn telescope holder cam clockwise to secure the telescope to the mount.

REFERENCE:

NONE

331-915-0831

PREPARE THE AMERICAN M18A1 57RR FOR BIPOD FIRING



CONDITIONS:

You will be given an M18A1 57RR, a bipod, and an M86F or M86C telescope.

STANDARDS:

Within 4 minutes prepare the weapon for firing from a bipod.

PERFORMANCE MEASURES:

1. Install bipod assembly on rifle.

a. Remove rifle cover. Place rifle, chamber fulcrum upward, on a firm surface.

b. Position bipod assembly over rifle so the bipod yoke assembly fits in chamber fulcrum, and yoke locking pin fits into notch on the side of chamber fulcrum.

c. Aline hole in bipod yoke assembly with the two chamber fulcrum holes. Insert the yoke body pivot assembly into the alined holes from the left side using a rotating motion. (If the pivot

assembly is inserted from the right side, it will interfere with the operation of the yoke locking pin.)

d. Install the two 723003 pads on the bipod arms.

2. Place bipod assembly into perpendicular position.

a. Pull upward on bipod arm assemblies near tube fulcrum assembly to disengage locking clips and free assembly.

b. Rotate bipod assembly toward the rifle breech until the yoke locking pin snaps into the notch on the right side of the chamber fulcrum, locking the bipod into an upright position.

3. Adjust the bipod for use on level ground.

a. Loosen the bipod arm large locking knob so that the bipod can be moved from side to side.

b. Center the arms on the rifle and retighten the large locking knob to hold the bipod in position.

c. Loosen bipod arm small locking knob. Grasping one of the bipod arms, pull bipod arms apart (both arms are geared together; moving one will automatically move the other). Tighten the small locking knob to lock the arms into position.

d. Turn the rifle right side up and place on the ground, facing the target. The rifle will rest on the two spread bipod arms and the extendible handle assembly.

4. Adjust bipod for use on uneven ground.

a. With the rifle upside down on a firm surface, loosen bipod arm large locking knob so that the bipod can be moved from side to side. Position the bipod so that the rifle, when supported on the spread bipod arms, will be level and the extendible handle assembly will be vertical.

b. Retighten the large locking knob to hold the bipod in position.

c. Loosen the bipod small locking arm. Grasping one of the bipod arms, pull bipod arms apart (both arms are geared together; moving one will automatically move the other). Retighten the small locking knob to lock the arms into position.

d. Turn the rifle right side up and place on the ground facing the target. The rifle should rest level on the spread bipod arms and the extendible handle assembly. If not, readjust until the rifle is level.

5. Adjust angle of elevation.

a. Large adjustments may be made by extending or retracting the extendible handle assembly.

b. To make small adjustments, rotate the slide.

c. If extending or retracting the extendible handle does not achieve the desired angle of elevation, adjust the spread of the bipod arms to raise or lower the weapon so that adjustments to the extendible handle will achieve the desired angle of elevation.

6. Install sighting and fire control instruments.

a. Open the telescope bracket socket by rotating the telescope holder cam. Make sure that the cam does not protrude into the socket.

b. Remove the telescope from carrying case and store case in ammo can. Hold the telescope above and at an angle to the mount, objective end frontward and down.

c. Slip telescope lug between the mounting lugs of telescope lug holder.

WARNING. Do not twist or move telescope sideways when positioned or you may break the telescope lug, the telescope lug holder, or both.

d. With an even, downward motion, fit the front projection on the telescope lug under the mating projection on the telescope lug holder; at the same time, insert the telescope bracket into the telescope bracket socket.

NOTE: If the bracket does not seat easily, either the telescope cam holder is not fully open or the telescope lug and telescope lug holder are not properly engaged. Check both.

WARNING. Do not bump the telescope with the heel of your hand or try to force it into position. You can break the lug, lug holder, or both.

e. Turn telescope holder cam clockwise to secure the telescope to the mount.

REFERENCE:

NONE

331-915-0832

PREPARE THE AMERICAN M18A1 57RR FOR SHOULDER FIRING



CONDITIONS:

You will be given an M18A1 57RR, a bipod, two 723003 pads, and an M86F or M86C telescope.

STANDARDS:

Within 4 minutes prepare the weapon for shoulder firing.

PERFORMANCE MEASURES:

1. Install bipod assembly.
 - a. Remove rifle cover. Place rifle fulcrum upward on a firm surface.

b. Position bipod assembly over rifle so the bipod yoke assembly fits in the chamber fulcrum and the yoke locking pin fits into the notch on the side of the chamber fulcrum.

c. Aline hole in bipod yoke assembly with the chamber fulcrum holes. Insert the yoke body pivot assembly into the alined holes from the left side using a rotating motion. (If the pivot assembly is inserted from the right side, it will interfere with the operation of the yoke locking pin.)

d. Install the two 723003 pads on the bipod arms.

2. Install the two 723003 pads.

a. Aline snap fasteners on one pad with button-type studs on one bipod arm. Press parts together.

b. Repeat to install other pad on other bipod arm.

3. Place bipod assembly in shoulder firing position.

a. Loosen bipod arm small locking knob, close bipod arm assemblies, and tighten knob.

c. Center bipod arm locking clips over tube fulcrum assembly on rifle by rotating bipod assembly forward, pivoting from chamber fulcrum. If clips lock to left or right of fulcrum, loosen bipod arm large locking knob and move bipod arms as required to center clips. Tighten knob when clips are properly centered.

4. Install sighting and fire control instrument. NOTE: M86C and M86F telescopes differ because the M86F sight has stadia lines and the M86C sight does not. Inspect instrument.

a. Inspect for completeness and general appearance. Reject instruments with rust, corrosion, nicks, burrs, or other flaws, chipped or flaking paint, or bare spots on painted surfaces.

b. Inspect the rubber eyeshield for cracks, fungus growth, dirt, and signs of wear.

c. Looking through the telescope, inspect for dirt, smears, scratches, digs, condensation, fungus growths, or chips that obstruct your view. Look through other end of telescope and repeat inspection.

d. Visually examine the reticle illuminating window to be sure that it is not broken and is securely sealed and fastened in the body of the telescope.

e. Replace defective parts or entire telescope as required.

REFERENCE:

NONE

331-915-0833

BORESIGHT THE AMERICAN M18A1 57RR



CONDITIONS:

You will be given an M18A1 57RR mounted on an M1917A2 tripod mount, M86F or M86C telescope, two 6-inch lengths of black linen string, a rubber band, pair of binoculars, and an identifiable target at a distance of 1,000 meters or more.

STANDARDS:

Within 10 minutes boresight the M18A1 57RR.

PERFORMANCE MEASURES:

1. Emplace the weapon.
 - a. Set tripod up in a stable position, legs firmly embedded in the ground.
 - b. Cross-level rifle as accurately as possible.
2. Install boresight.

a. Open rifle breech, remove and disassemble breech mechanism until firing pin can be removed. Reassemble the breech mechanism so that the firing pin hole can be used as a peephole. Replace it on the rifle.

NOTE: An expedient boresight may be made from the cutoff base of an empty cartridge case with the primer removed. This can be slipped into the breech end of the rifle using the primer hole as the peepsight; the breech mechanism will not have to be removed.

b. Attach two pieces of black linen string tightly across witness marks on muzzle and secure with elastic band.

3. Aline rifle bore with aiming point.

a. Look through the firing pin hole of the breechblock (or cartridge case primer hole) and through the bore of the rifle.

b. Elevate and traverse the weapon until the strings across the witness marks at the muzzle end of the bore are alined with the selected distant aiming point. When this alinement has been obtained, do not move the rifle.

NOTE: Use one side of a binocular as an aid when viewing the distant aiming point.

4. Aline telescope with aiming point.

a. Install telescope (M86F or M86C) in the sight mount.

b. Look through the telescope. If necessary, adjust the sight mount elevation and azimuth so the boresighting cross on the reticle pattern alines with the distant aiming point.

5. Adjust azimuth.

a. Loosen the azimuth clamping nut (fig. 1).

b. Turn the azimuth eccentric until the vertical line of the boresighting cross on the reticle pattern alines with the distant aiming point (fig. 2).

c. Correct elevation by alining any portion of the vertical broken line on the reticle pattern with the aiming point.

d. Tighten the azimuth clamping nut. Check the line of sight and azimuth to be sure it has not shifted.

CAUTION: Failure to loosen the azimuth clamping nut before adjusting for azimuth will damage the sight mount.

6. Adjust elevation (fig. 3).

a. Loosen the telescope holder clamping screw and the elevation clamping screw.

b. Turn the elevation eccentric until the horizontal line of the boresighting cross of the reticle is on the distant aiming point (fig. 4).

c. Tighten the telescope holder clamping screw and the elevation clamping screw and check the line of sight and elevation to be sure it has not shifted.

CAUTION. Failure to loosen both the telescope holder clamping screw and the elevation clamping screw before adjusting for elevation will damage the sight mount.

7. Aline open sights with aiming point.

a. Prepare for open sighting.

(1) Raise the M26 folding front sight to its open position.

(2) Raise the sight leaf to its open position.

b. Lower peepsight to lowest position. If this cannot be done, follow procedure below.

(1) Loosen the peepsight clamping screw.

(2) Move the peepsight to its lower position on the leaf.

(3) Tighten the clamping screw.

c. Match the center (0) graduation of the windage scale with its index line on the telescope holder by rotating the adjusting windage screw.

d. Look through the lower notch in the triangular cutout of the peepsight to the distant aiming point. If the front sight projection on the M26 folding front sight does not aline with the peepsight notch and distant aiming point, loosen the two front sight clamping screws and rotate the front sight around the rifle barrel until the front sight projection comes into alinement. Tighten the front sight clamping screws to retain this adjustment.

8. Check adjustments.

a. Check alinement of bore and distant aiming point frequently during adjustments. Accidental shifting of the weapon during adjustments will result in inaccurate boresighting.

b. After adjustments are made, check alinement of telescope and open sights for accuracy. Repeat alinement procedures.

9. Remove boresights.

a. Remove the cord or string from the witness marks on the muzzle end of the rifle.

b. If an empty cutoff cartridge case base was used as a boresight, remove the base from the rifle.

c. If the breechblock was used for sighting through the breech end of the rifle, remove the breechblock, assemble the breech mechanism group, and install the breech mechanism group of the rifle.

d. Close the breech.

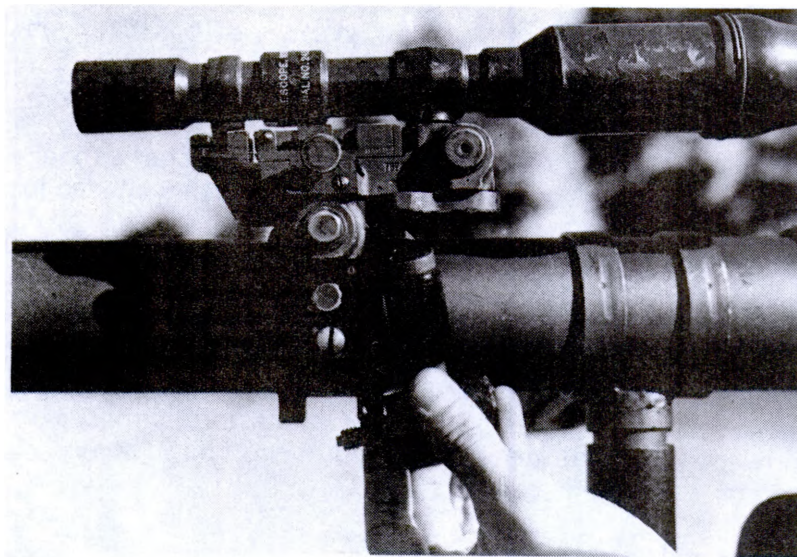


Figure 1

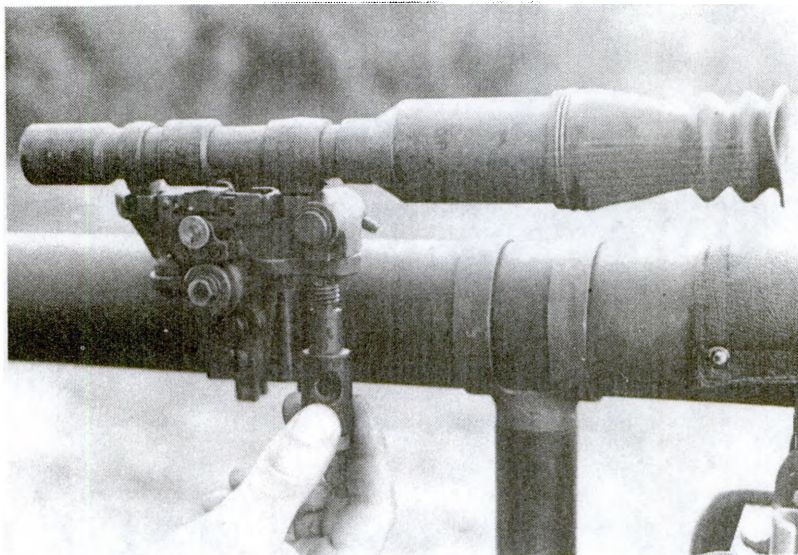


Figure 2

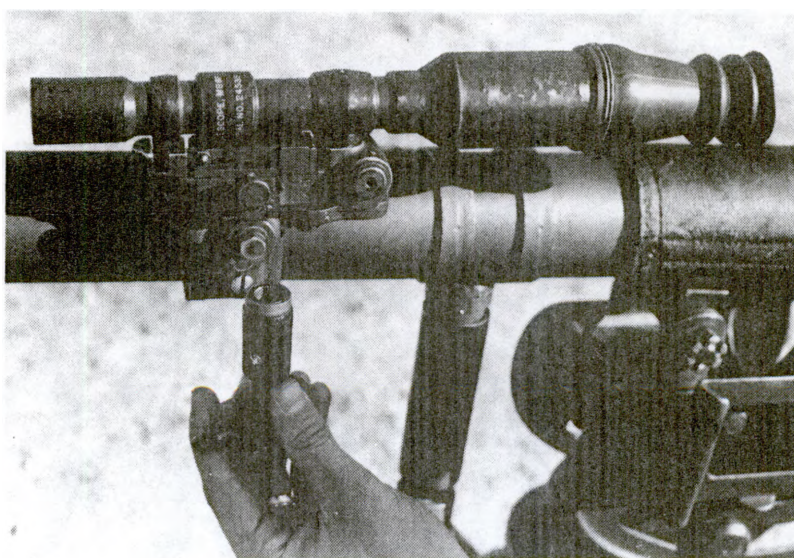


Figure 3

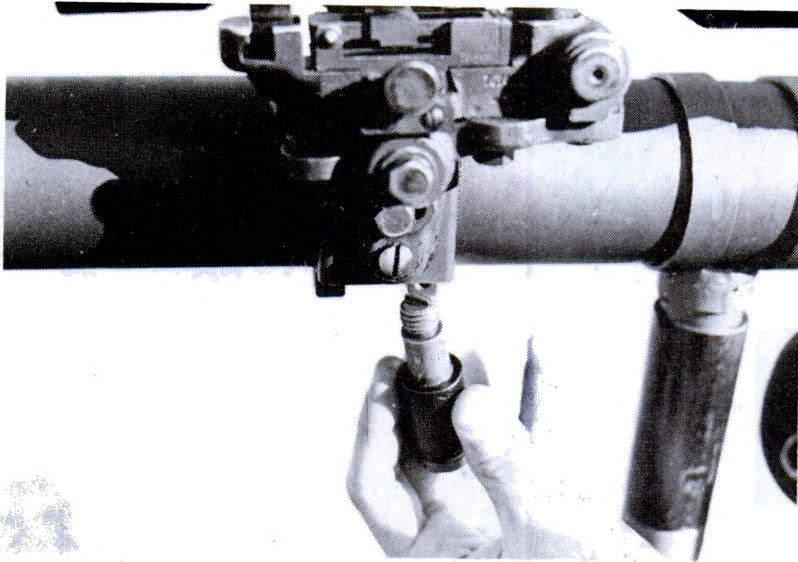


Figure 4

REFERENCE:

NONE

331-915-0834

ENGAGE TARGETS WITH THE AMERICAN M18A1 57RR



CONDITIONS:

You will be given a boresighted M18A1 57RR with M86C or M86F telescope mounted on M74 or M1917A2 tripod, two rounds of HE ammunition, an assistant gunner, and a stationary target at 600 meters.

STANDARDS:

Within 5 minutes during daylight on a live firing range, score at least one round on target.

PERFORMANCE MEASURES:

1. Observe all safety measures.

- a. Never stand directly behind the rifle or allow any portion of the body (particularly the arms) to be directly behind the breech when opening or closing a breech with a live round in the chamber.

- b. Always determine the layout of the rear danger area (due to blast and flying debris) before firing.

(1) Pace off (or measure) a distance of 80 feet straight back from the breech, along the line of the bore.

(2) Pace off (or measure) a distance of 46 feet to the right and left of the 80-foot point. (This will give you a triangular area behind the rifle with the top point at the breech of the rifle--the rear danger area.)

c. Clear personnel from rear danger area before firing.

NOTE: Personnel within the rear danger area but more than 30 feet behind the rifle when fired are considered safe if they face away from the rifle at the time of firing.

d. Do not fire rifle if obstructions or obstacles are in a position to confine the rear blast. Change weapon location if necessary.

e. Do not fire rifle from where there are obstructions or obstacles within 50 feet behind the breech. (Such objects may reflect the rear blast enough to injure the rifle crew.)

f. After the weapon has been fired continuously, the chamber and tube will be hot. Care must be exercised to avoid injury when operating the breech or moving the rifle.

g. Take precautions to prevent cookoffs. If rifle has been fired at a rate of 6 rounds or more per minute for 25 or more rounds in temperatures less than 60° F. or at lower rates in warmer temperatures, the barrel will be hot.

(1) Immediately abandon the rifle and move personnel to a safe distance.

(2) After 1 hour the rifle may be unloaded. (The heat of the barrel can cause the fuse, projectile filler, or propellant to explode or cook off, particularly if the cylindrical pellets of propellant have cut the cartridge case liner and fallen into the chamber. Inspection of ammunition prior to firing will reveal splits in case liners. Rounds with broken case liners will not be used. They will be moved to a safe distance from the firing point and reported to ordnance maintenance personnel for disposition.)

2. Load the rifle (assistant gunner).

a. Open breech; inspect for and remove any foreign matter which may be in the bore or chamber.

b. Wipe dry all surfaces of the breech mechanism group, including all recesses in the striker assembly, breechblock carrier assembly, and breechblock.

c. Put the round into the chamber with your left hand, supporting and guiding it with your right. When the projectile won't go any further, turn it until the projectile is alined with the rifling in the tube and can be pushed in until the headspace bands on the cartridge case stop it.

d. Steady the rifle with your right hand on the chamber handle; close and lock the breech.

e. Move the safety lever to the "fire" position and signal the gunner that the weapon is ready to fire.

3. Sight (gunner).

a. M86C telescope.

(1) Elevate and traverse the rifle until the target is on the telescope reticle.

(2) Place the target image on the horizontal (east-west) broken line representing the known or estimated range.

(3) Center the target on the vertical (north-south) broken line.

b. M86F telescope.

(1) The stadia lines of the M86F telescope are spaced to estimate the range of a 20-foot target, such as the length of a tank. Make allowances for the relative sizes of longer or shorter targets.

(2) If the target is a tank broadside, for example, elevate and traverse the weapon until the end points of the target image touch the stadia lines on the reticle. If a tank target is facing directly toward or away from the weapon, position the edges of the target image between either stadia line and the vertical broken line at the center of the reticle pattern.

(3) Read the range to the target at the point where the ends of the target image touch the stadia line.

(4) After obtaining the range, center the target image on the vertical broken line of the reticle.

(5) Keep target image at same range level by using stadia lines.

4. Fire rifle.

a. Kneel on the left side of the rifle and place your right hand under the rifle. Grasp the trigger handle so that your fingers circle the trigger and your thumb touches the trigger safety. Grasp the elevating knob of the mount with the left hand.

b. When assistant gunner signals that the weapon is ready to fire, press the trigger safety with your thumb and squeeze the trigger with your fingers.

5. Unload empty cartridge case (assistant gunner).

a. Open the breech.

b. Catch the empty cartridge case with the fingers and thumb as the case is extracted and discard the empty case to the rear. Wear protective gloves to avoid burns since the empty cartridge case is always hot immediately after firing. Use your left hand to extract the empty case.

REFERENCE:

NONE

331-915-0835

APPLY IMMEDIATE ACTION TO THE AMERICAN M18A1 57RR



CONDITIONS:

You will be given an M18A1 57RR, ammunition, and assistant gunner.

STANDARDS:

Within 3 minutes apply immediate action to eliminate the malfunction when the weapon fails to fire.

PERFORMANCE MEASURES:

1. Identify possible malfunctions.

a. Misfire. A misfire is a complete failure to fire due to a faulty firing mechanism, faulty firing linkage, or a faulty element in the propelling charge explosive train. A misfire in itself is not dangerous but, since it cannot be immediately distinguished from a delay in the functioning of the firing mechanism or from a hangfire, it should be considered as a possible delayed firing until certain. Such delay in the functioning of the firing mechanism could result from the presence of foreign matter such as grit, sand, frost, ice, improper or excessive oil, or grease. These create a partial mechanical restraint which is overcome as the continued force applied by the spring and the firing pin

are driven into the primer in the normal manner. No round should be left in a hot weapon any longer than the circumstances require due to the possibility of a cookoff.

b. Hangfire. A hangfire is a delay in the functioning of a propelling charge explosive train at the time of firing. The amount of the delay is unpredictable but in most cases is within the range of a split second to several minutes. A hangfire cannot be distinguished immediately from a misfire, and here lies the principal danger--that of assuming that a failure of the weapon to fire is a misfire where, in fact, it may be a hangfire. The time intervals prescribed should be observed before opening the breech after a failure to fire. These time intervals have been established to minimize the danger of a hangfire and to prevent the occurrence of a cookoff.

c. Cookoff. A cookoff is a functioning of any or all of the explosive components of a round chambered in a very hot weapon. With temperatures less than 600° F., cookoffs may be expected when firing more than 25 rounds at 6 rounds or more per minute. When firing with temperatures in excess of 600° F., the probability of cookoffs may increase. If the igniter or the propelling charge should cook off, the projectile may be fired from the weapon with normal velocity even though no attempt was made to fire. In this case, although you may not be sure the round will fire, the precautions to be observed are the same as those for a hangfire.

WARNING. Should the bursting charge explosive train cook off, injury to personnel and destruction of the weapon may result.

2. Apply corrective action.

WARNING. In case of an explosive round chambered in a rifle that has been fired before the misfire at the rate and under the conditions cited in paragraph 1c or in excess thereof, the rifle will be very hot. All personnel will stand clear of the weapon and danger area of rear blast until such time as the weapon and chambered round are cool to avoid the danger from possible cookoff of the explosive projectile.

a. Hangfire.

(1) If rifle fails to fire, all personnel (except the gunner and assistant gunner) will move to safe positions.

(2) Wait 1 minute then recock and attempt to fire the rifle again.

(3) If rifle still does not fire, apply corrective action for a misfire.

b. Misfire.

(1) Firing pin or ammunition failure. On pulling the trigger, you will hear the striker assembly drive forward but the round fails to fire; wait 1 minute then recock the rifle. Make another attempt to fire. If the rifle fails to fire, the assistant gunner waits 1 minute and unloads the round. The gunner and assistant gunner will examine the round.

(a) If the primer indentation appears normal, the round will be turned over to the ordnance maintenance officer. If ordnance assistance is not available, the round will be moved to a safe distance, kept separated from other ammunition, and reported to ordnance maintenance personnel for disposal. Firing may continue.

(b) If the primer is not normal, the ordnance maintenance officer will be requested to examine the rifle to find the cause of failure to fire. Examine the breech mechanism for possible cause of failure to fire. Examine the breech mechanism for possible cause of malfunctioning as follows: With the breechblock open, the sear should be retracted by the sear lever and the breechblock rotated to the locked position while open.

1. If the firing pin sticks out from the face of the breechblock and does not appear broken or worn away, protrusion of the firing pin may have been reduced by accumulated dirt or carbon on the firing pin shoulder or in the firing pin bushing. Disassemble the breechblock and clean the firing pin, firing pin recess in the breechblock striker assembly, and recess in breechblock carrier assembly. Assemble the breechblock. Firing may continue, starting with the same round.

2. If the firing pin is broken or if the point of the firing pin is worn away, disassemble the striker assembly and replace the firing pin. Firing may continue, starting with the same round.

(2) Firing linkage failure. If you do not hear the striker assembly fall when the trigger is pulled, treat as a misfire.

(a) If the striker assembly is in the cocked position and did not fall on the first attempt to fire, the striker assembly will usually fall on the second try if the fault is excessive slack in the firing linkage. If the rifle fires on the second attempt, stop firing until ordnance maintenance personnel can make repairs.

(b) If the striker does not fall on the second attempt to fire, try to open the breech.

1. If the breechblock is difficult to open, slowly release the breechblock after it has been rotated 15°-20° (to unlock). If, when released, the breechblock rotates toward the locked

position, the striker assembly is forward and is pressing against the cocking cams on the breechblock. Open the breechblock and remove the round. Request ordnance maintenance personnel to examine the rifle and make repairs.

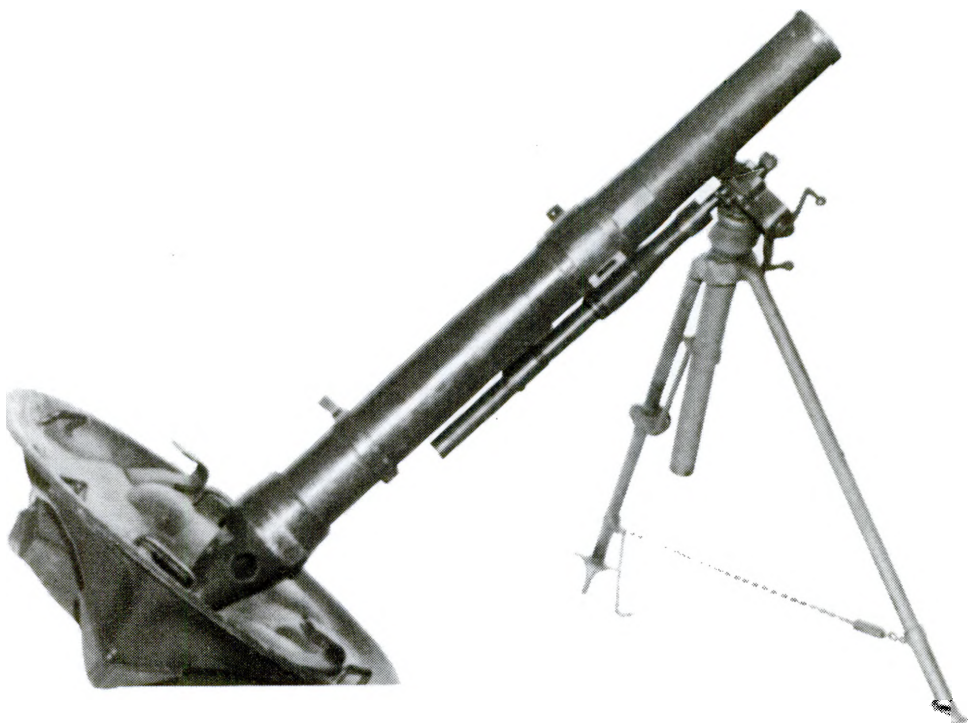
2. If the breechblock opens easily, striker assembly has not fallen and is held in the rear position by the sear. Remove the round. Remove the rifle from service until the breech assembly can be disassembled and repairs made.

REFERENCE:

NONE

331-915-0836

IDENTIFY THE SOVIET 120MM (4.72 IN) MORTAR



CONDITIONS:

You will be given a 107mm (4.2 in) mortar and a 120mm (4.72 in) mortar.

STANDARDS:

Within 15 seconds, identify the 120mm (4.72 in) mortar.

PERFORMANCE MEASURES:

The 120mm (4.72 in) mortar resembles the 107mm (4.2 in) mortar, except that:

1. The 120mm (4.72 in) can be wheel-mounted; the 107mm (4.2 in) cannot.

2. The 120mm (4.72 in) can be manually fired; the 107mm (4.2 in) cannot.

3. The 120mm (4.72 in) (73 inches long) is approximately half a foot longer than the 107mm (4.2 in) (67.7 inches long).

4. The 120mm (4.72 in) is fired with a bipod; the 107mm (4.2 in) is fired with a bridge and trunnion.

REFERENCE:

None

071-319-3151

PERFORM OPERATOR MAINTENANCE
ON A 90MM RCLR

CONDITIONS:

Given a 90mm recoilless rifle; a contour brush; artillery cleaning brush; clean, dry rags; dry cleaning solvent or mineral spirits; preservative lubricating (PL) (Special) oil; and rifle bore cleaner.

STANDARDS:

Within 30 minutes field strip the weapon, inspect weapon for unserviceable parts, clean all parts of weapon of foreign particles that will hinder operation, lubricate weapon with a light coat of oil, and reassemble weapon.

PERFORMANCE MEASURES:

1. General Disassembly of Weapon (fig. 1).
 - a. Make sure weapon is cleared and not cocked.
 - b. With breechblock in the closed and locked position, unscrew firing pin cap and remove firing pin spring.
 - c. Rotate the safety 45° counterclockwise from the "FIRE" position; pull up and remove.
 - d. Pull hinge block end of the cable assembly forward and remove it from the hinge block.
 - e. Unlock and open breechblock. Push downward on hinge pin and remove both, taking care to keep the breechblock in upward position.
 - f. Remove extractor.
 - g. To prevent the sear from dropping down and blocking the locking, hold the breechblock with the hinge portion up, depress the detent plunger and spring, rotate the locking counterclockwise, and remove.
 - h. Turn the breechblock over and remove the sear.

i. Remove the detent plunger and spring.

j. Insert the small end of the hinge pin into the rearward end of the breechblock housing. Remove the firing hammer and hammer bushing from the front of the breechblock housing.

NOTE: The removal of the firing hammer and hammer bushing should only be accomplished under the following conditions:

(1) The weapon fails to fire and the firing hammer must be inspected for possible damage or fouling.

(2) A visual inspection of the firing hammer and hammer bushing during maintenance detects damage or fouling.

Unnecessary repeated removal of these components will cause undue wear.

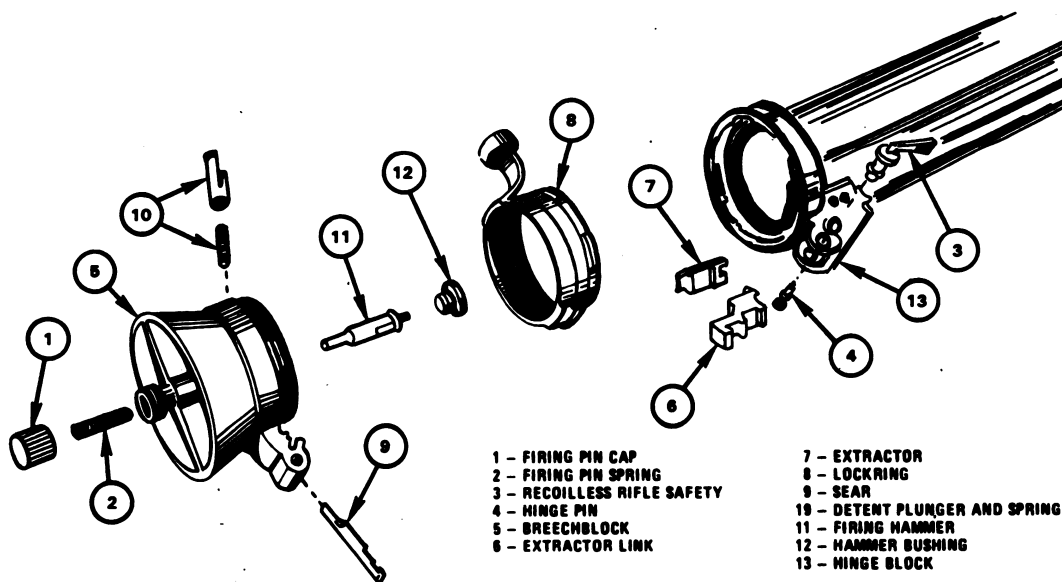


Figure 1

2. Inspection of Weapon.

- a. An external inspection of the weapon is conducted to determine if it is damaged beyond safe or serviceable limits.
- b. Inspect to insure that weapon is assembled correctly (FM 23-11, sec II, page 7, para 8b(2)).
- c. Inspect for looseness of brackets, lockwashers, locknuts, locking wires, and connecting tubes/wires.
- d. Inspect for excessively worn components which may result in a failure to fire.

3. Cleaning and Lubrication of Weapon.

- a. Use only cleaning solvent or mineral spirits (paint thinner) to clean grease or oil from all metal parts, except those exposed to powder fouling during firing.
- b. Use rifle bore cleaner to clean all armament parts which have been exposed to powder fouling. After using bore cleaner, wipe dry and oil lightly.
- c. After all parts are cleaned, rinse and dry them thoroughly. Apply preservative lubricating (PL) (Special) oil to all polished metal surfaces, other than optical equipment.

4. Assembly of Weapon (fig. 1).

- a. Holding the breechblock with the hinge portion up, install hammer bushing and firing hammer.
- b. Replace the sear.
- c. Replace the detent plunger and spring.
- d. While holding the breechblock with the hinge portion up, depress the detent plunger and install the lockring, turning it clockwise until tight; then turn counterclockwise until two distinct clicks are heard.
- e. Install the extractor and extractor link.
- f. With the extractor link in its full extract position, install the breechblock, making sure that the hinge portion of the breechblock enters the opening in the hinge block and engages the recess in the extractor link.

g. Aline the hinge pin holes in the breechblock and hinge block, then install the hinge pin.

h. Install the cable assembly in the hinge block with the notched portion that will mate with the safety facing away from the rifle tube.

i. Position the recoilless rifle safety 45° clockwise from the "FIRE" position, push downward, and rotate it clockwise to the "FIRE" position.

j. Install the firing pin spring and firing pin cap.

REFERENCE:

FM 23-11, 90mm Recoilless Rifle, M67, C2 & 3, Jul 65 (chap 2, sec II, pages 6-8, para 8b)

071-319-3152

BORESIGHT THE 90MM RCLR

CONDITIONS:

During daylight, given a 90mm RCLR, two pieces of thread, a rubber band or masking tape, a boresight disk, a combination wrench (or screwdriver), and a designated target beyond 400 meters.

STANDARDS:

Within 5 minutes, aline both the sight and the bore so that the edge of the target is alined at the same point of intersection of both sets of crosshairs (fig. 1).

PERFORMANCE MEASURES:

1. Using the rubber band, or the masking tape, secure the two pieces of thread across the four notches located on the muzzle of the weapon so as to form a cross. The point of intersection of the thread marks the axis of the bore at the muzzle end of the rifle.

2. Insert the boresight disk in the chamber to determine the axis of the bore at the breech.

3. Select an aiming point beyond 400 meters to any likely target. With the eye held several inches behind the breech, aline the axis of the bore on the aiming point by elevating and traversing the rifle.

4. Look through the telescope and insure that the boresight cross of the sight reticle is alined on the aiming point at the same point of intersection of both sets of crosshairs. If the boresight is not alined, bring it to the aiming point by rotating the elevation and azimuth correction screws with either the screwdriver end of the combination wrench or a small screwdriver. Recheck the alinement through the bore and through the sight. When the sight and the bore are properly alined on the aiming point, the 90mm RCLR is boresighted (fig. 1).

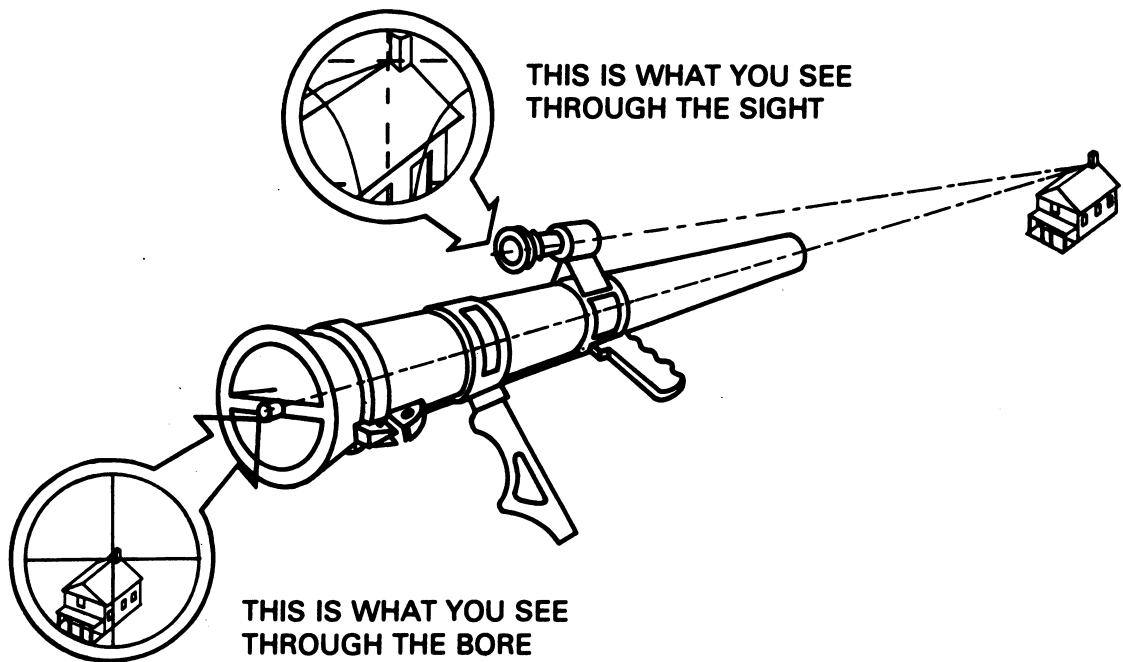


Figure 1

REFERENCE:

FM 23-11, 90mm Recoilless Rifle, M67, C2 & 3, Jul 65 (chap 5, sec VI, pages 56-57, para 92 a-e)

071-319-3153

LOAD, UNLOAD, AND CLEAR A 90MM RCLR

CONDITIONS:

As assistant 90mm RCLR gunner (loader) with a man to act as gunner, given a cleared, assembled, and boresighted 90mm RCLR, one round (practice) ammunition, a general firing position, an initial fire command, and a requirement to assist the gunner while engaging a target.

STANDARDS:

1. Situation 1: Loader must load and give gunner an "UP" signal within 30 seconds.
2. Situation 2: Loader must unload and clear weapon within 30 seconds.
3. Situation 3: Loader performs the procedures outlined in paragraph 3 of the performance measures within 30 seconds, when the weapon misfires.

PERFORMANCE MEASURES:

1. LOADING. When the command "LOAD" is given, the assistant gunner:
 - a. Opens the breechblock, insuring that the weapon is clear. (If breechblock is already open, insure that weapon is clear.)
 - b. Inserts round into chamber, seating it firmly.
 - c. Closes and locks breechblock.
 - d. Checks backblast area.
 - e. Rotates safety to "F" position.
 - f. Taps gunner and calls "UP."
2. UNLOADING AND CLEARING. When the command "UNLOAD" is given, the assistant gunner:

- a. Rotates safety to "S" position. (Not required if round has been fired.)
- b. Opens breechblock.
- c. Removes round (or expended cartridge) and lays it aside.
- d. Inspects chamber.
- e. Calls "CLEAR."

3. IMMEDIATE ACTION.

a. When the rifle fails to fire, the gunner releases pressure on the trigger and calls "MISFIRE." The loader repeats "MISFIRE," and waits 1 minute. Then the loader unlocks and locks the breech and calls "UP." The gunner attempts to fire.

b. Should the rifle fail to fire, the gunner releases pressure on the trigger and calls "MISFIRE." The loader repeats "MISFIRE," and again waits 1 minute. Then the loader opens the breech and unloads, being careful to catch the round as it is extracted.

NOTE: If the rifle has been fired continuously for a considerable length of time, it becomes hot. This might cause the propellant charge to ignite by cookoff. If the rifle is hot, cool the water before removing the cartridge. If water is not available, all personnel will leave their positions until the rifle has cooled (training only).

REFERENCES:

FM 23-11, 90mm Recoilless Rifle, M67, C2 & 3 Jul 65 (chap 2)
TM 9-1015-223-12, Operator and Organizational Maintenance Manual, 90mm Recoilless Rifle, M67, C1-6, Feb 62 (chap 3, sec III, page 25, para 42-44)

071-319-3155

ENGAGE TARGETS WITH A 90MM RCLR

CONDITIONS:

During daylight, on a 25-meter subcaliber range, given a boresighted 90mm RCLR with zeroed 7.62mm subcaliber device, 78 rounds of caliber 7.62mm ammunition, a requirement to fire course C for qualification firing, and equipment as outlined in FM 23-11 for course C.

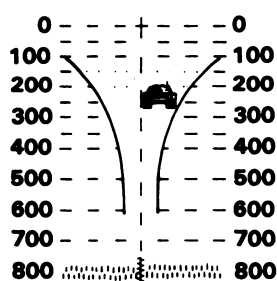
STANDARDS:

Obtain a minimum score of 230, firing tables I and II twice within time allotted.

PERFORMANCE MEASURES:

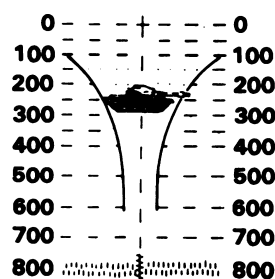
1. Range Determination.

a. Range Estimation. The primary method of estimating range with the 90mm RCLR is to use the stadia lines. Stadia lines are curved lines inscribed on the sight reticle. They measure distances based on the size an average tank appears at varying distances when observed through the M103 sight. To estimate range, the gunner adjusts the lay of the rifle until the target exactly fits between the stadia lines. The point of the vertical (range) line of the reticle, that corresponds to the center of mass of the target, indicates the range. On targets showing more flank than front, a full stadia picture is used. If more of the front than the flank is shown, a half-stadia picture is used. When using a half-stadia picture, a sight adjustment must be made to place the appropriate range line on the center mass of the target. Figures 1 and 2 show how the stadia lines are placed on both the flank and frontal target. In both examples, they indicate that the targets are at a range of 275 meters.



Half stadia picture.

Figure 1



Full stadia picture.

Figure 2

b. Apparent Speed Estimation (fig. 3). The speed at which a target seems to move toward or away from the line of sight is called apparent speed. In figure 3, Tank A has no apparent speed no matter how fast it is moving because it is moving directly toward the gunner. Tank B has an apparent speed equal to its actual speed because it is moving perpendicular to the gunner's line of sight. Tank C, moving at the oblique, has an apparent speed less than its actual speed.

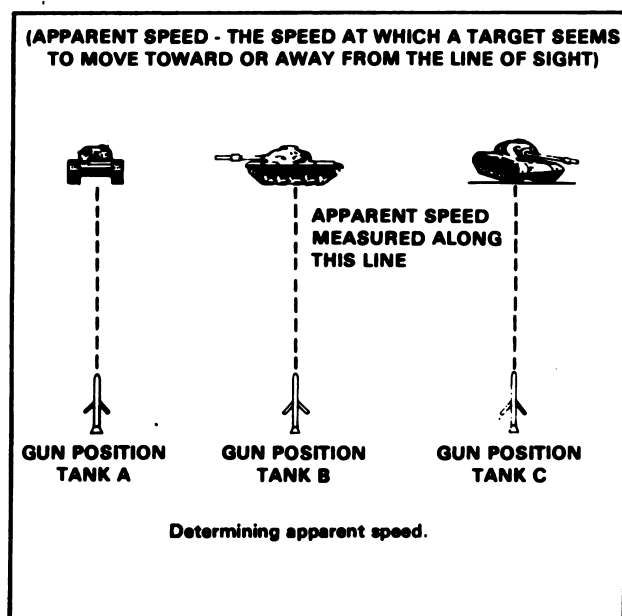


Figure 3

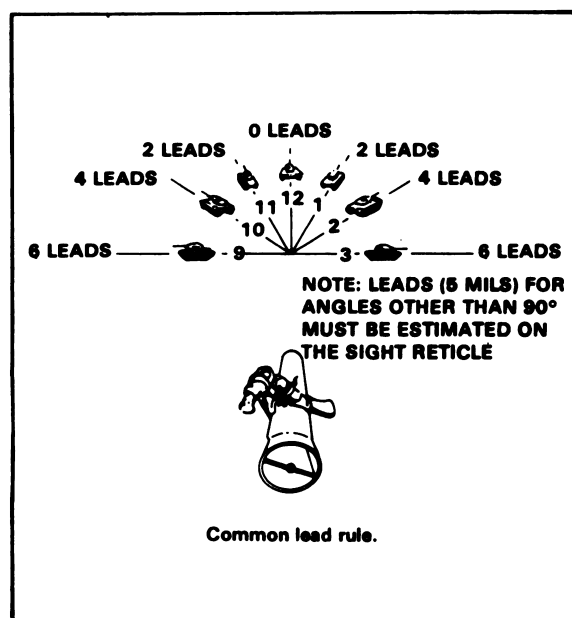


Figure 4

c. Lead Estimation (fig. 4).

(1) A moving target is led by the distance it travels from the time the rifle is fired until the projectile crosses the path of the target. The number of leads applied varies with the apparent speed of the target, but not the range.

(2) One lead is applied on the sight reticle for each 2 1/2 miles per hour of apparent speed of the target.

(3) As a common lead rule, the number of leads required is determined by the direction the target is moving in relation to the gun position (fig. 4). Target speed is assumed to be 15 miles per hour. If the target is moving directly toward or away from the gun position, no leads are required.

2. Adjustment of Fire using Burst-On-Target.

a. Observe where the round impacts in relationship to the target when observed through the sight reticle.

b. Note where this impact appears on the sight reticle and place that point onto the center mass of the target.

REFERENCE:

FM 23-11, 90mm Recoilless Rifle, M67, C2 & 3, Jul 65 (pages 42-47, para 69; page 49, para 72-75)

071-317-3301

CONDUCT A PREOPERATIONAL INSPECTION OF
THE DRAGON TRACKER AND ROUND

CONDITIONS:

Given a Dragon tracker and a round of ammunition (inert round for training only), lens tissue, wood dowel, ethyl alcohol.

STANDARDS:

Within 5 minutes, complete a preoperational inspection of the Dragon tracker and round of ammunition in accordance with the performance measures below.

PERFORMANCE MEASURES:

1. Preoperational Inspection of a Round of Ammunition (fig. 1).
 - a. Check the exterior surface for oil, dirt, or grease.
 - b. Check the forward shock absorber for loose cushions, cracks, or other visible damage.

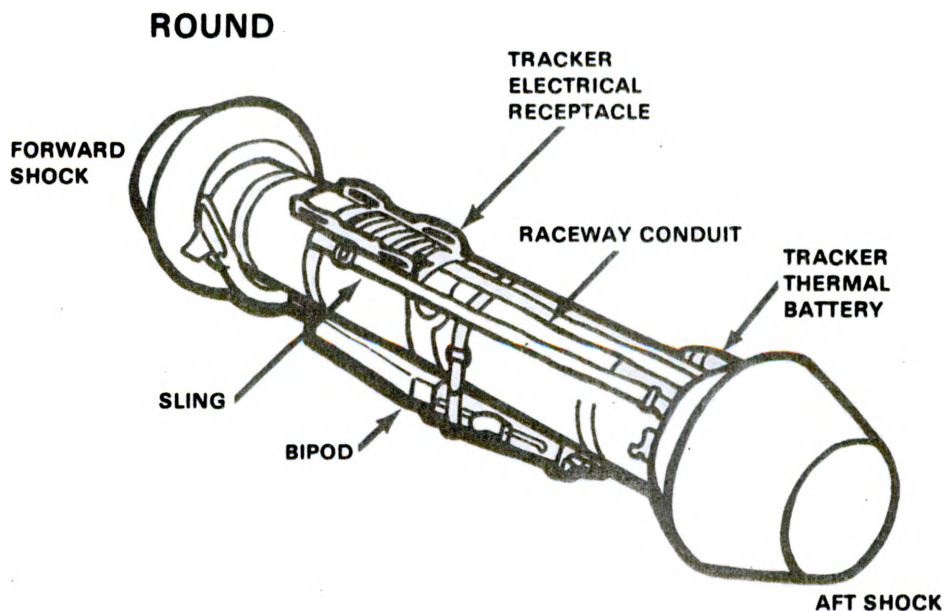


Figure 1
3-179

c. Inspect the tracker support assembly for damage and firm fit of the cover on the electrical connector. Remove the cover and inspect the electrical connection for damage.

d. Inspect the raceway conduit for damaged wires.

e. Check the electrical cable nipple for damage (the cable nipple is the connection from the raceway conduit to the thermal battery).

f. Inspect the thermal battery for damage.

g. Inspect the AFT shock absorber for loose cushions, cracks, or other visible damage.

h. Inspect the carrying sling for rips, tears, or other damage.

i. Inspect the launcher tube for gouges, cracks, punctures, and other visible damage.

h. Check the bipod for damage and insure the retaining strap is secured.

NOTE: Do not lower or extend the bipod to perform this inspection.

k. Inspect the round for legible markings; i.e., lot number and nomenclatures.

l. Check the humidity indicator card (fig. 2) through the viewport in the face of the forward shock absorber. The indicator's circles should be blue.

NOTE: If not blue, turn in if situation permits.

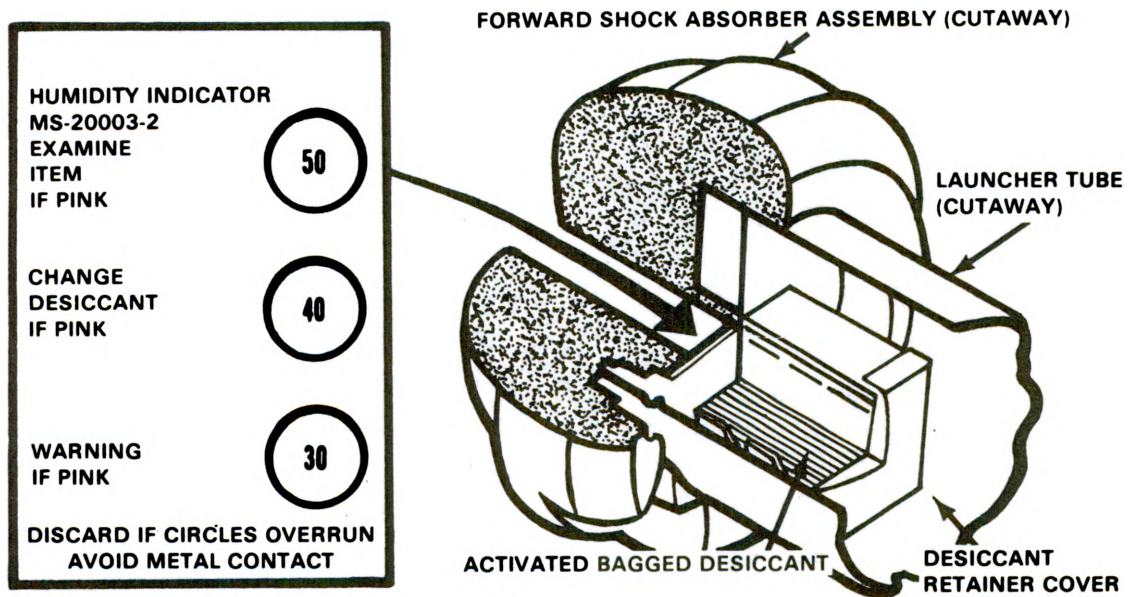
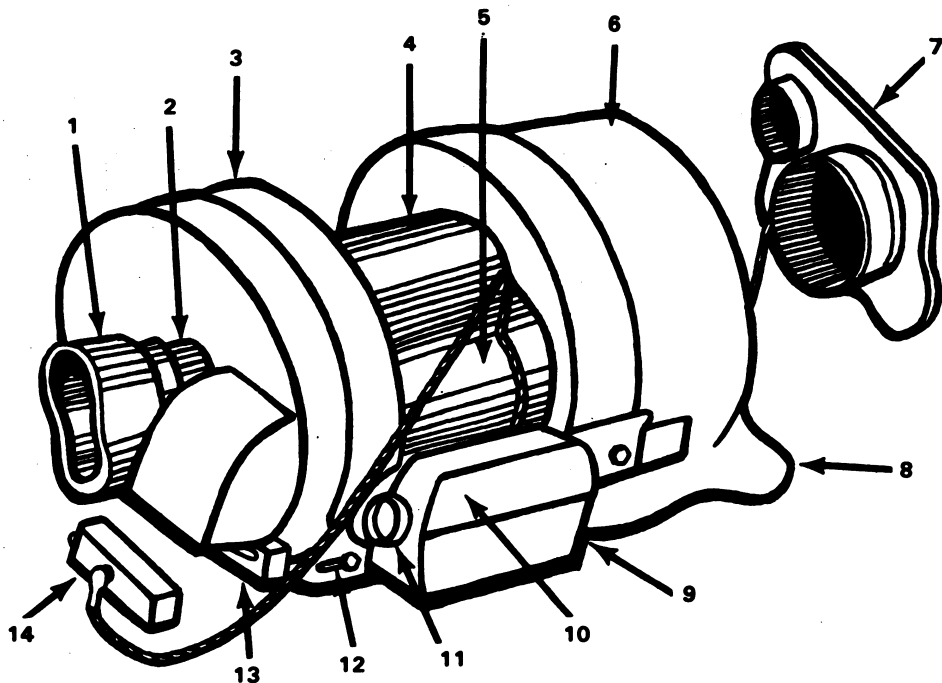


Figure 2

2. Preoperational Inspection of the Tracker (fig. 3).

- a. Check the external surfaces for oil, dirt, or grease.
- b. Inspect the shock absorbers to insure they are present, tight, and not damaged.
- c. Remove the lens cover and inspect all lenses for dirt, cracks, or chips. If the lenses are dirty, clean with the tissue, wood dowel, and ethyl alcohol provided in the tracker bag.
- d. Check to insure the trigger lever will not operate unless the safety is depressed. Depress the safety and check for freedom of operation. A slight metallic click should be heard when the safety is depressed.



- | | |
|-------------------------------|--|
| 1. EYEGUARD | 8. LANYARD |
| 2. SIGHT ADJUSTMENT | 9. FIRING MECHANISM |
| 3. AFT SHOCK ABSORBER | 10. TRIGGER LEVER BOOT |
| 4. OPTICAL SIGHT ASSEMBLY | 11. TRIGGER SAFETY PLUNGER BOOT |
| 5. INFRARED RECEIVER ASSEMBLY | 12. GUIDE PIN BREACH |
| 6. FORWARD SHOCK ABSORBER | 13. ELECTRICAL CONNECTOR |
| 7. LENS COVER | 14. ELECTRICAL CONNECTOR COVER W/LANYARD |

Figure 3

WARNING. Do not perform a preoperational inspection of the tracker with it mated to the round.

e. Depress the safety and check the trigger lever for freedom of operation. A metallic click should be heard when the trigger is depressed.

f. Inspect the eyeguard for cracks, other visible damage, and a secure fit which allows rotation (fig. 3). The eyeguard should rotate independent of the focus ring.

g. Look through the sight and rotate the knurled focus adjusting ring from limit to limit. Check for freedom of operation, and that sight adjustment provides visible focusing of the reticle and target.

h. Check the electrical connector cover for damage and a secure fit.

- i. Inspect the electrical connector for damage or dirty contacts.
- j. Inspect the access cover for loose screws or damage.
- k. Inspect the guide pins for physical damage.
- l. Inspect all optical lens for moisture or evidence of fogging inside the lens.

REFERENCE:

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, Aug 74, (chap 5, pages 43-50, para 5-3 thru 5-6)

071-317-3302

PREPARE THE DRAGON FOR FIRING

CONDITIONS:

In daylight or darkness in a field environment, with LBE and individual weapon; given a round of ammunition in the carrying configuration (inert for training only) and tracker in the carrying bag.

STANDARDS:

Mate the tracker to the round of ammunition IAW the performance measures below.

PERFORMANCE MEASURES:

1. Unsnap the web strap holding the bipod (fig. 1).

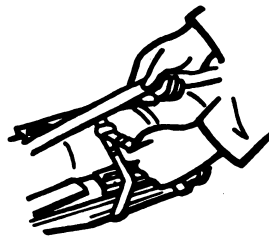


Figure 1

2. Lower bipod to the vertical lock position. Don't worry about the forward shock popping off - it's supposed to (fig. 2).

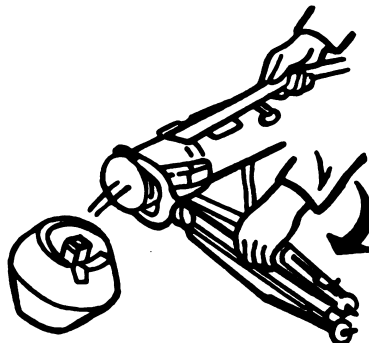


Figure 2

3. Check that the forward bipod brace is engaged (fig. 3).

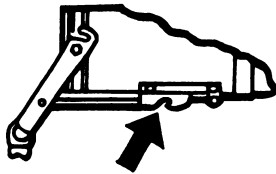


Figure 3

4. Depress the bipod friction lock and extend the legs (fig. 4).

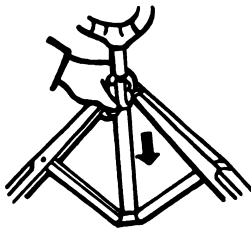


Figure 4

5. Remove the electrical connector cover from the round (fig. 5).

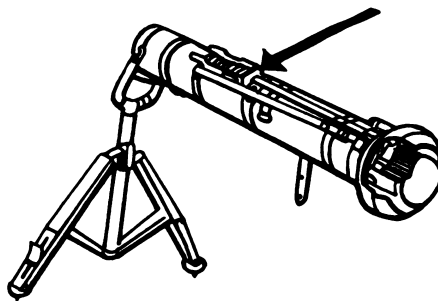


Figure 5

6. Remove the tracker from the carrying bag and remove the protective cover from the tracker electrical receptacle (fig. 6).



Figure 6

7. Secure the tracker electrical receptacle cover to the tracker forward shock absorber (fig. 7).

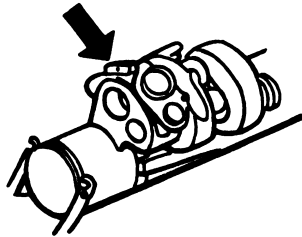


Figure 7

8. Place tracker guide pins in slots of tracker support guide rails, then push tracker firmly to the rear using both hands, until it locks in place (fig. 8).

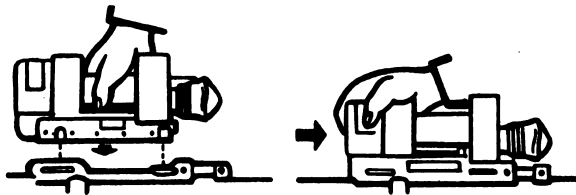


Figure 8

9. Remove the tracker lens cover and secure to tracker forward shock absorber. Make rapid visual inspection of tracker lens for damage or obstructions (fig. 9).

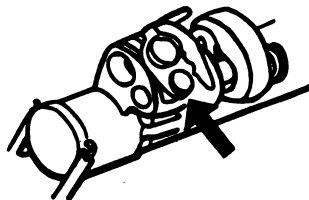


Figure 9

10. Adjust the bipod friction lock and the foot adjusts to obtain a level sight picture (fig. 10).

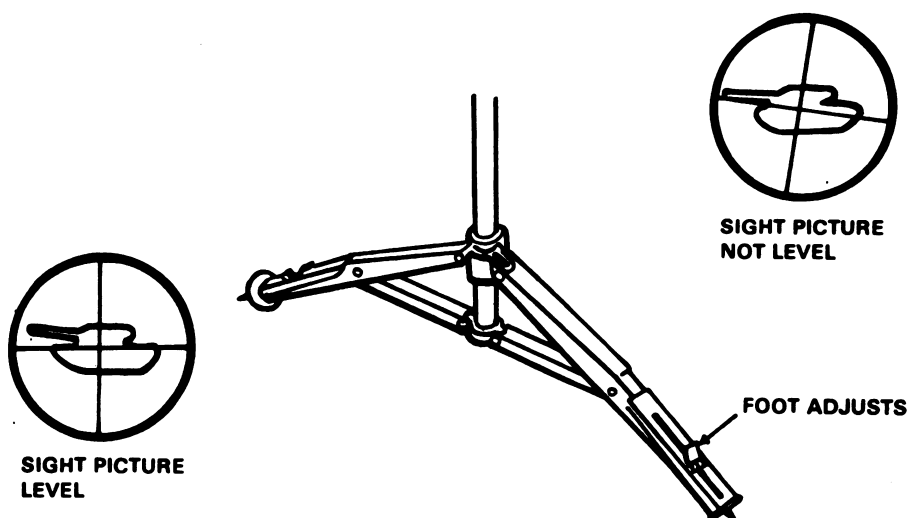


Figure 10

REFERENCE:

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, Aug 74
(chap 5, pages 41-50, para 5-1 thru 5-6)

071-317-3303

 DETERMINE IF A TARGET IS ENGAGEABLE

CONDITIONS:

Acting as a Dragon gunner, during daylight or darkness (with artificial illumination), with an operational Dragon weapon system, given targets moving into your sector of responsibility.

STANDARDS:

Within 5 seconds, determine if there are targets within range that can be engaged.

PERFORMANCE MEASURES:

1. To acquire a target:

a. Focus the sight using the sight adjustment.

b. Hold the sight adjustment stationary while rotating the eyeguard to fit the eye (fig. 1).

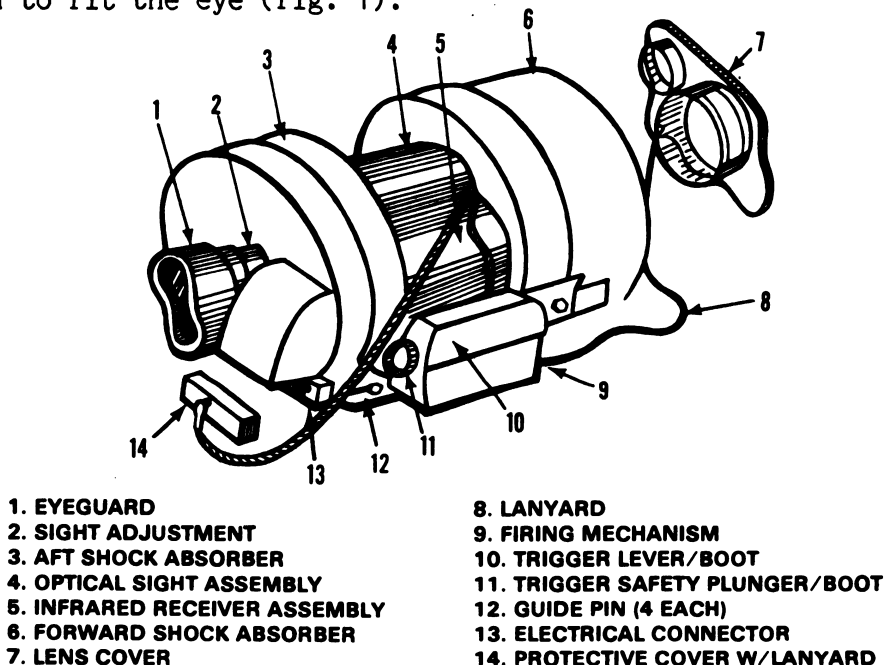


Figure 1

c. When the target has been acquired, evaluate the target to determine if it is within range.

(1) Flanking targets (full-stadia).

(a) Adjust the sight picture (by moving the launcher) to center the target between the stadia lines (fig. 2).

(b) If the target falls between the stadia lines, it is not within range (fig. 3).

(c) If the target meets or exceeds the stadia lines, it is within range (fig. 4).

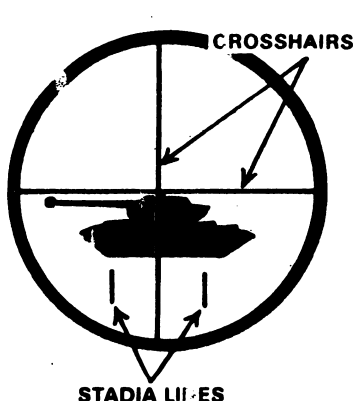


Figure 2

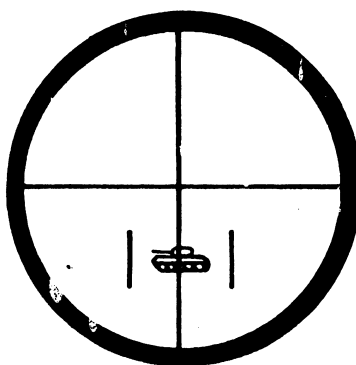


Figure 3

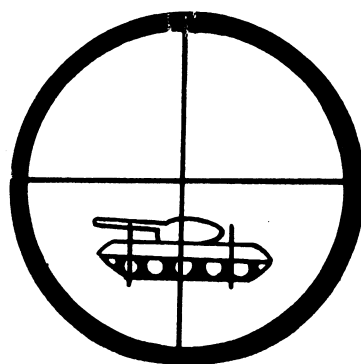


Figure 4

(2) Targets moving toward or away from you (half-stadia).

(a) Adjust the sight picture to center the target between the vertical crosshair and one of the stadia lines.

(b) If the target falls between the vertical crosshair and stadia lines, the target is not in range (fig. 5).

(c) If the target meets or exceeds the vertical crosshair and one of the stadia lines, it is in range (fig. 6).

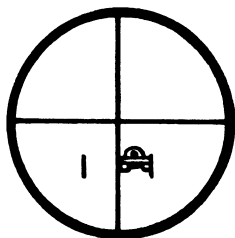


Figure 5

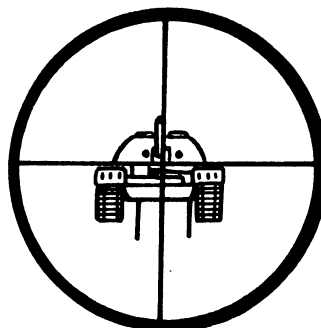


Figure 6

(3) Oblique targets.

(a) If you can see more of the side than the front, use the full-stadia method.

(b) If you can see more of the front than the side, use the half-stadia method.

2. To determine if the target is engageable:

a. Place the edge of the sight on the target and inspect the anticipated path of the vehicle to the opposite edge of the sight.

b. If there is a covered area long this path (fig. 7), there is not enough time to fire and hit the target. The target is NOT engageable.

c. If there are no covered areas (fig. 8), there is enough time to fire and hit the target. The target IS engageable.

d. Use the full sight method to determine target kill areas in your sector of fire. This information may be placed on your antiarmor range card.

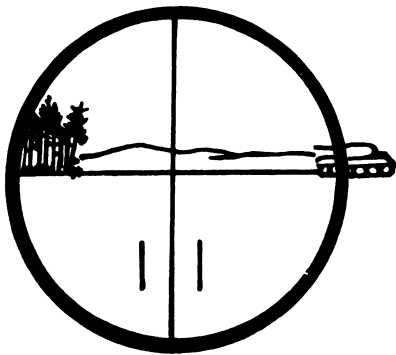


Figure 7

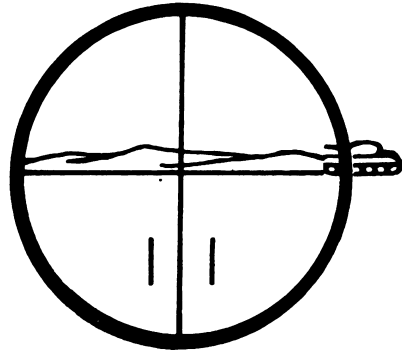


Figure 8

REFERENCE:

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, Aug 74
(chap 4, page 38, para 4-2f)

071-317-3304

DEMONSTRATE CORRECT DRAGON FIRING POSITIONS

CONDITIONS:

During daylight or darkness in a field environment, with LBE and individual weapon; given a round of ammunition (inert) and a tracker attached to the round. The Dragon is prepared for firing IAW the task: Prepare the Dragon for Firing.

STANDARDS:

Assume either the kneeling or standing supported firing position and be prepared to engage a target--

1. Within 15 seconds for designated gunners.
2. Within 30 seconds for nondesignated gunners.

PERFORMANCE MEASURES:

1. The Dragon should be fired from the kneeling or standing supported position. The sitting and prone positions can be used but are not recommended.

- a. Kneeling position (fig. 1).

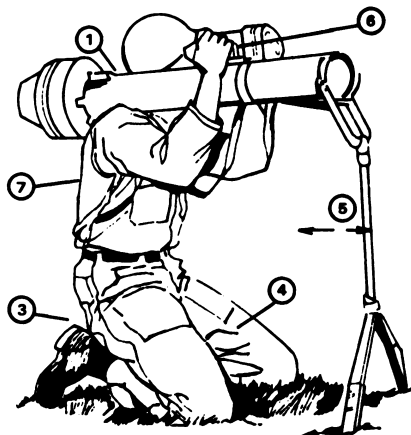


Figure 1

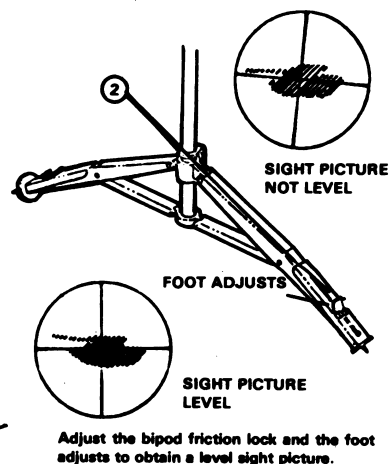


Figure 1a

NOTE: Numbers of the following paragraphs are keyed to numbers on the figures.

(1) As the gunner, place the launcher on your right shoulder as close to the curve of the neck as possible.

(2) Adjust the bipod legs and feet for height and proper leveling (figure 1a).

(3) Point the toes of both feet into the ground with the heels elevated and buttocks resting on the heels.

(4) Place both knees on the ground and keep them spread wide.

(5) Take the slack out of the bipod by pushing forward or pulling backward.

(6) Grasp the left portion of the tracker (optical sight between the shock absorber) with the left hand and the trigger assembly with the right hand. The right thumb is positioned on the safety plunger, three fingers on the trigger lever and the little finger forward of the trigger lever.

(7) Bend forward at the waist until the right eye is pressed firmly against the tracker eyeguard.

(8) Tuck your elbows beneath the tracker and keep them close together.

(9) Apply constant downward and rearward pressure on the tracker.

b. Standing supported position (fig. 2).



Figure 2

(1) Position the Dragon launcher and bipod legs as discussed in the kneeling position. (The bipod feet are placed in a trench when using the fighting position; in the grill of the M113 when firing from the cupola of an M113.)

(2) Position hands, elbows, and bipod as discussed in the kneeling position.

(3) Spread legs approximately shoulder-width apart, bend slightly forward at the waist until your eye is pressed firmly against the tracker, and brace against the front of a foxhole or sandbags--or commander's cupola of an M113.

2. Steady hold factors:

a. Place the round in the meaty part of the right shoulder.

b. Place the right eye firmly against the eyeguard (insure eyeguard is adjusted for contour of the face) and adjust the optical sight to focus on the target.

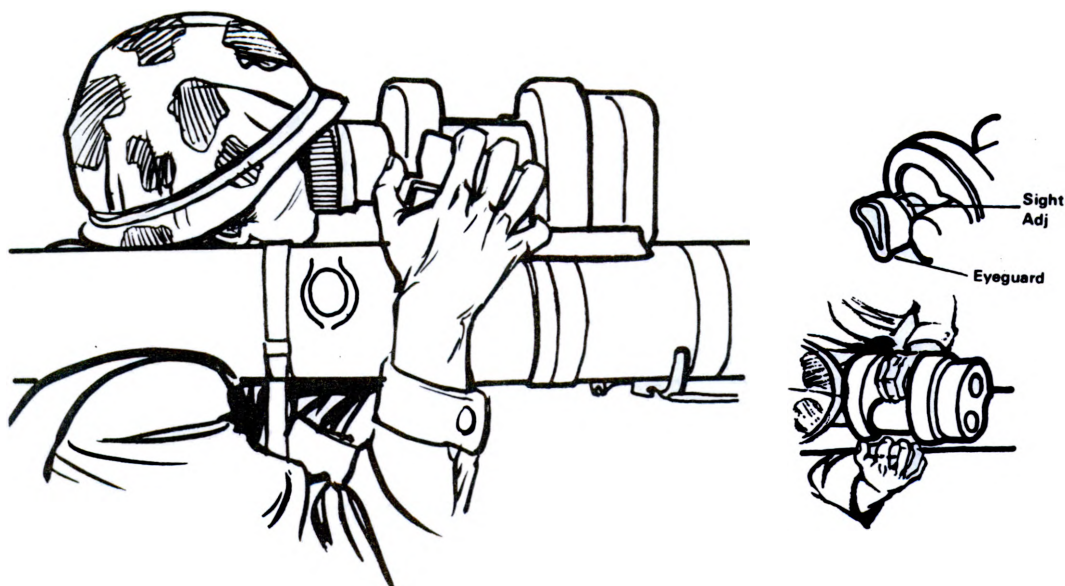


Figure 3

NOTE: The eye should be pressed as firmly as possible against the eyeguard so the gunner cannot blink his eye if he tries. Blinking the eye would probably cause the gunner to lose control of the missile once it is fired.

c. Position the right hand on the trigger mechanism with the thumb on the safety plunger, three fingers on the trigger bar, and the little finger in front of the trigger mechanism, as shown in figure 3.

d. Place the left hand with four fingers between the shock absorbers on the optical sight with the thumb curled underneath the sight.

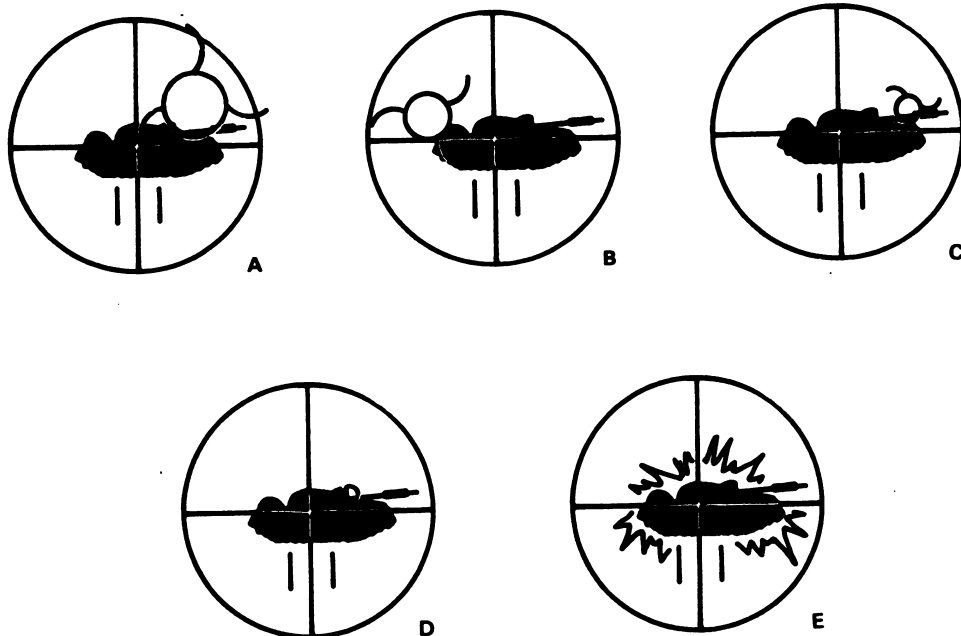
e. Maintain steady downward and rearward pressure in all positions to prevent any movement of the weapon when the missile is launched.

f. For Dragon sight picture, see figure 4. The gunner must acquire the target, maintain a smooth tracking rate, and keep the crosshairs on the center of mass of the target from missile launch until missile impact.

Whenever the missile appears in your sight picture --- IGNORE IT!!

DON'T TRY TO FLY THE MISSILE!

Keep the crosshairs on the target and let the Tracker do the guiding of the missile ---



The in-flight missile has peculiar flight characteristics which cause it to fly within a two foot radius of the direct line of sight.

Figure 4

REFERENCE:

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, Aug 74
(chap 7, pages 68 and 69, para 7-4 thru 7-5)

071-317-0000

PREPARE AN ANTIARMOR RANGE CARD
(TOW, DRAGON, 106MM, OR 90MM RCLR)

CONDITIONS:

During daylight, in a field environment, with field clothing and combat equipment with weapon, given any of the above weapon systems, a designated firing position, a sector of fire, target reference data, paper, pencil, and a compass.

STANDARDS:

Within the time designated, prepare a range card that illustrates a representative sketch of the terrain and includes--

1. The firing position indicated by the appropriate weapon symbol.
2. The location of the firing position indicated by its distance and azimuth from a known point.
3. A sector of fire indicated by an enclosed solid line which shows complete boundaries, maximum engagement line, and:
 - a. Ranges and azimuths to anticipated target engagement locations and target reference points within the sector of fire.
 - b. Deadspace within the sector of fire.
4. Magnetic north arrow (properly oriented).
5. Marginal data:
 - a. Unit designation (no higher than company).
 - b. Time and date of preparation.
 - c. Firing position designation (primary, alternate, or supplementary).

PERFORMANCE MEASURES:

1. A range card is a sketch of the terrain that a weapon has been assigned to cover by fire. It contains information which assists in the planning and control of fires, in the rapid detection and engagement of targets, and in the orientation of replacement personnel or units. By using a range card, a gunner can quickly and accurately determine the information he needs to engage targets.

2. Sector of Fire.

a. A sector of fire is a portion of the battlefield within which you are responsible to engage targets with your weapon. Leaders assign sectors of fire to insure that no matter where an enemy target approaches, there will be a weapon positioned which can engage it. After he shows you where to position your weapon, your leader will indicate your sector of fire by pointing out the portion of the terrain for which you are responsible. He will do this by giving you boundaries located between prominent terrain features or by left and right limits indicated by terrain features or azimuths (fig. 1). If necessary, he may also assign you more than one sector of fire and will designate one as primary and others as secondary.

b. Your leader may also designate anticipated target engagement locations within your sector of fire. These are recognizable terrain features on or near likely enemy avenues of approach (fig. 1). This information is placed on your range card.

c. Starting at the company level, commanders may pick out natural or manmade terrain features on the battlefield which can be used as reference points for locating targets and adjusting direct fires. These are called target reference points (TRPs) and are assigned a specific letter and number. If there are TRPs in or near your sector of fire, your leader may point them out and tell you the letter and number (fig. 1). If he does, they are shown on your range card.

d. There may be natural or manmade terrain features such as hills, draws, or buildings within your sector(s) of fire which prevent you from hitting a target. The area blocked by these features is called deadspace. All deadspace in your sector(s) of fire must be determined because your leaders need to plan other types of fire (mortars, artillery, mines, etc.) to cover the area. Deadspace is indicated on your range card.

e. The length of your sector of fire is normally limited by the maximum engagement range of your antiarmor weapon but it can be less if there are any natural or manmade terrain features which prevent you from engaging targets at maximum engagement range (trees, fences, etc.). Regardless of what affects it, the maximum engagement range is shown on your card as a maximum engagement line.

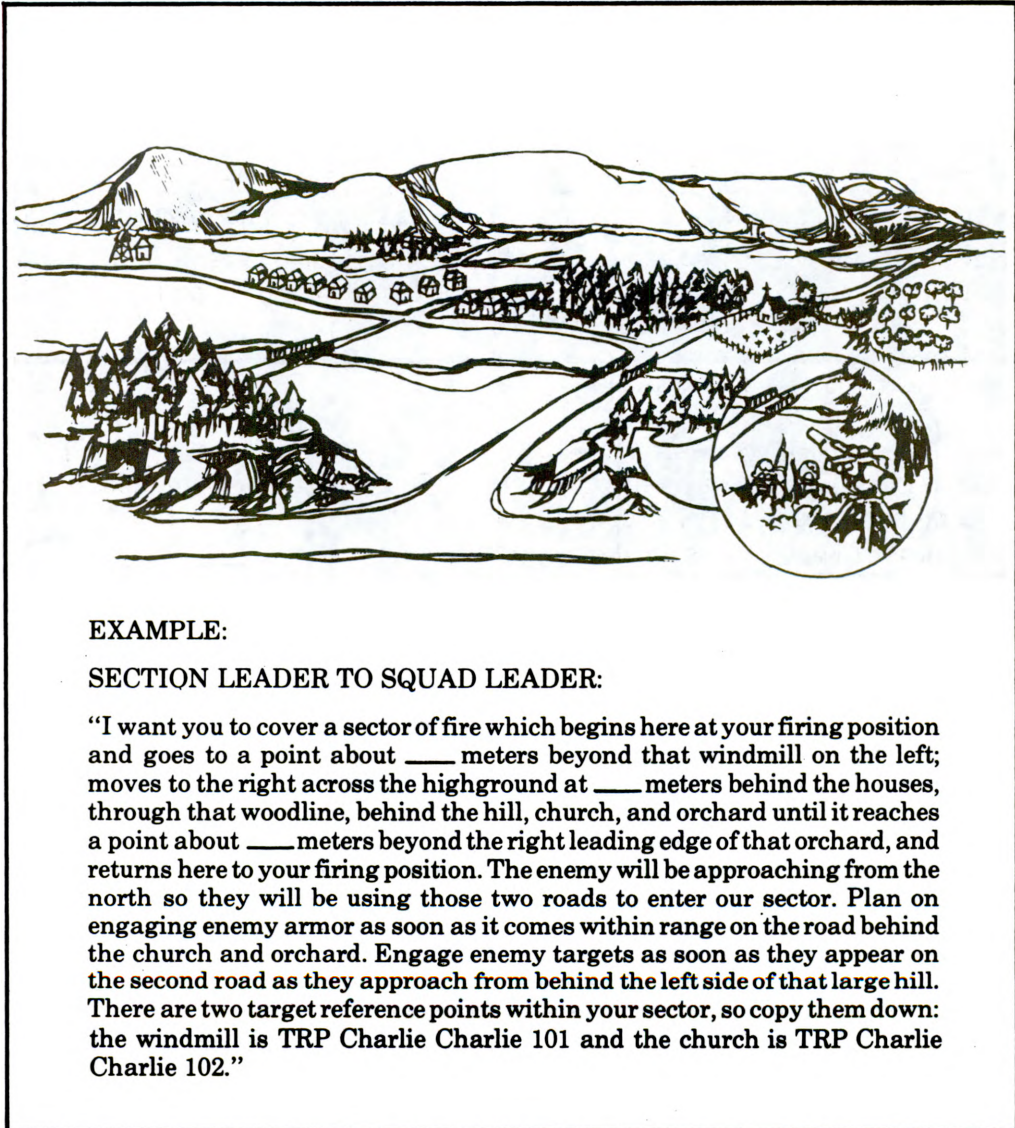


Figure 1

3. Preparation of the Range Card.

a. Once your leader has given you the necessary information, you can begin preparing your range card, depending upon the priority of other jobs you must perform, such as preparing and camouflaging your firing position. If you are assigned alternate and supplementary firing positions, a range card is required for them also.

b. Procedures:

(1) In the lower center of your range card, indicate your firing position by drawing the symbol for your assigned weapon.

(2) Show the location of your firing position by drawing a sketch of a nearby recognizable terrain feature. Label it and draw an arrow to the weapon symbol. Add the distance and azimuth from the terrain feature to your firing position (fig. 2).

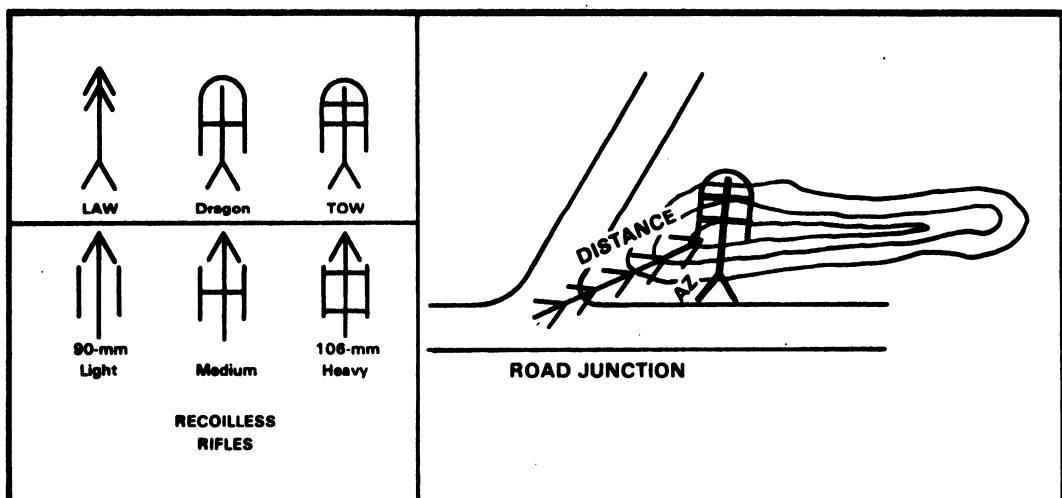


Figure 2

(3) Draw and label sketches of terrain features which indicate the boundaries of your sector of fire. Draw lines from your weapon symbol to the terrain features (fig. 3).

(4) Draw and label sketches of terrain features which include:

(a) Anticipated target engagement location--Draw an arrow, range, and azimuth (fig. 4).

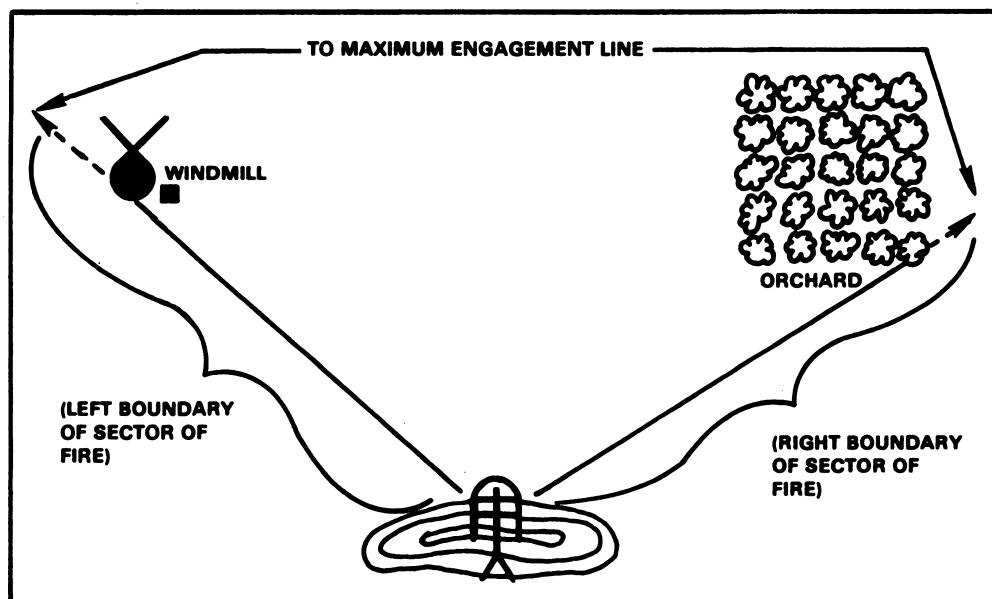


Figure 3

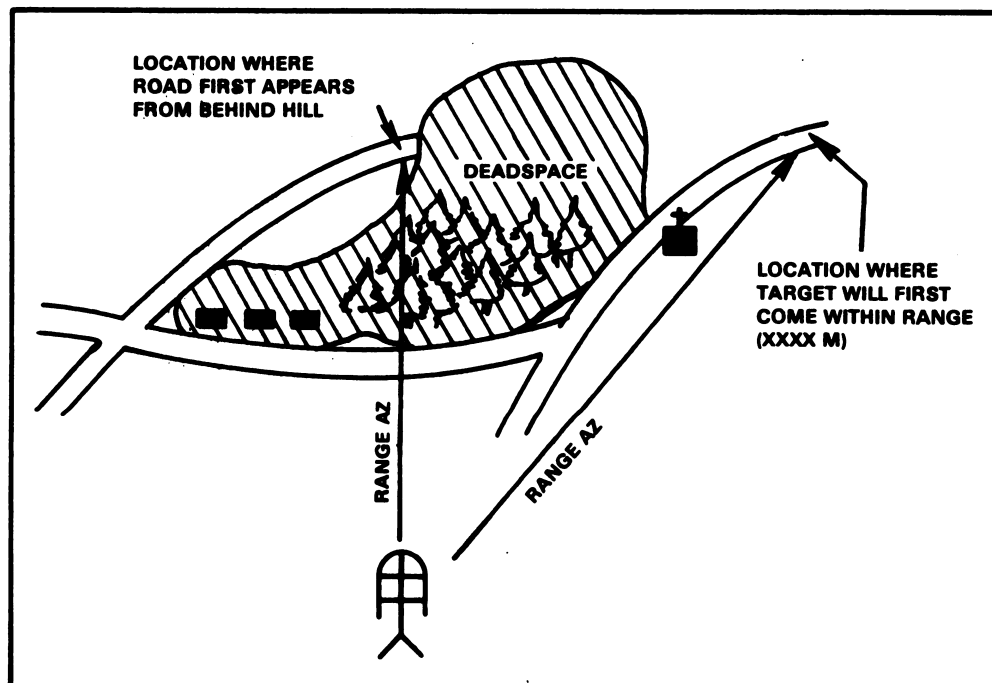


Figure 4

(b) TRPs--Draw an arrow, range, and azimuth. Indicate the TRP designation (fig. 5).

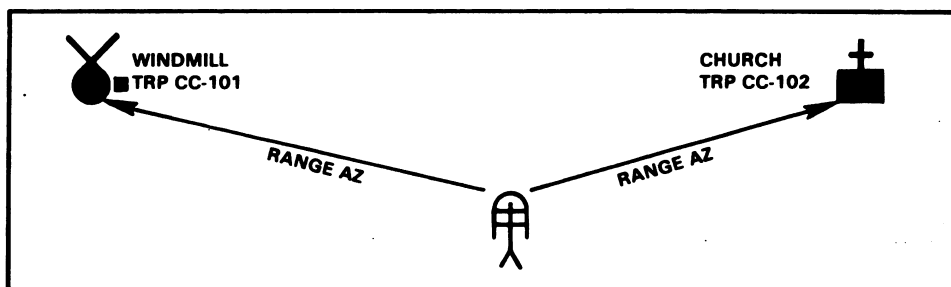


Figure 5

(c) Deadspace--Place diagonal lines or word "DEADSPACE" where significant deadspace occurs (fig. 6).

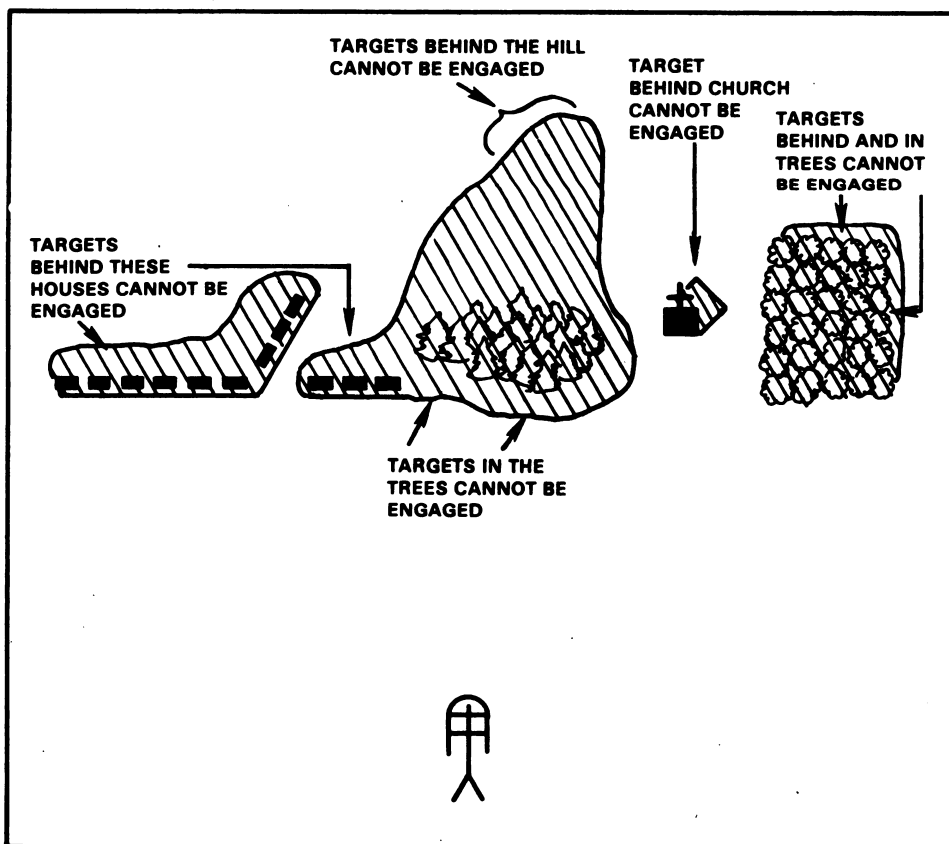


Figure 6

(d) Maximum engagement line--If there are no limitations, the line will be curved and will join the left and right sector of fire boundaries at maximum engagement range (fig. 7). If there are limitations, the maximum engagement line is drawn in front of the limiting terrain features (fig. 8).

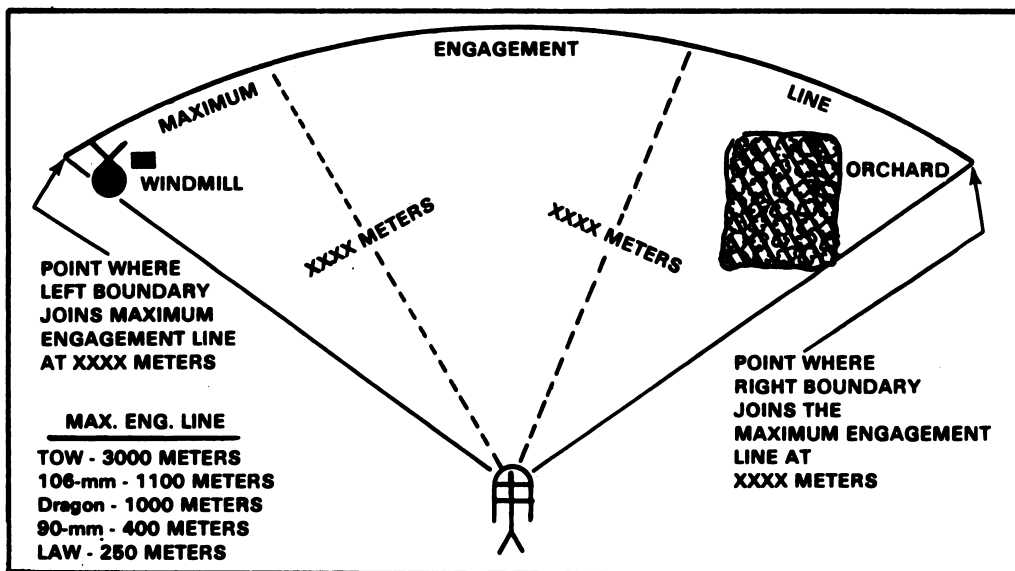


Figure 7

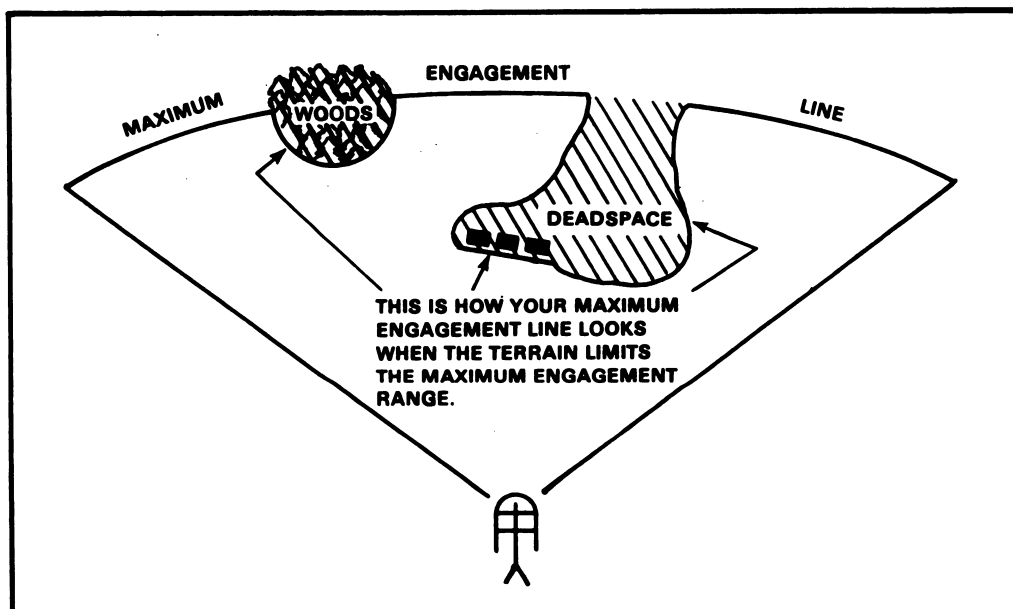


Figure 8

(5) Orient the range card with the terrain and determine the direction of magnetic north with a compass. Draw a magnetic north arrow using the straight edge of the compass (fig. 9).

(6) In a corner of your range card, place the following marginal data which is used by leaders to identify range cards:

(a) Unit description--Never indicate your unit higher than your company. If your range card gets lost, the enemy will not be able to learn important military information if they find your range card (fig. 9).

(b) Time and date of preparation (fig. 9).

(c) Type position (primary, alternate, supplementary) (fig. 9).

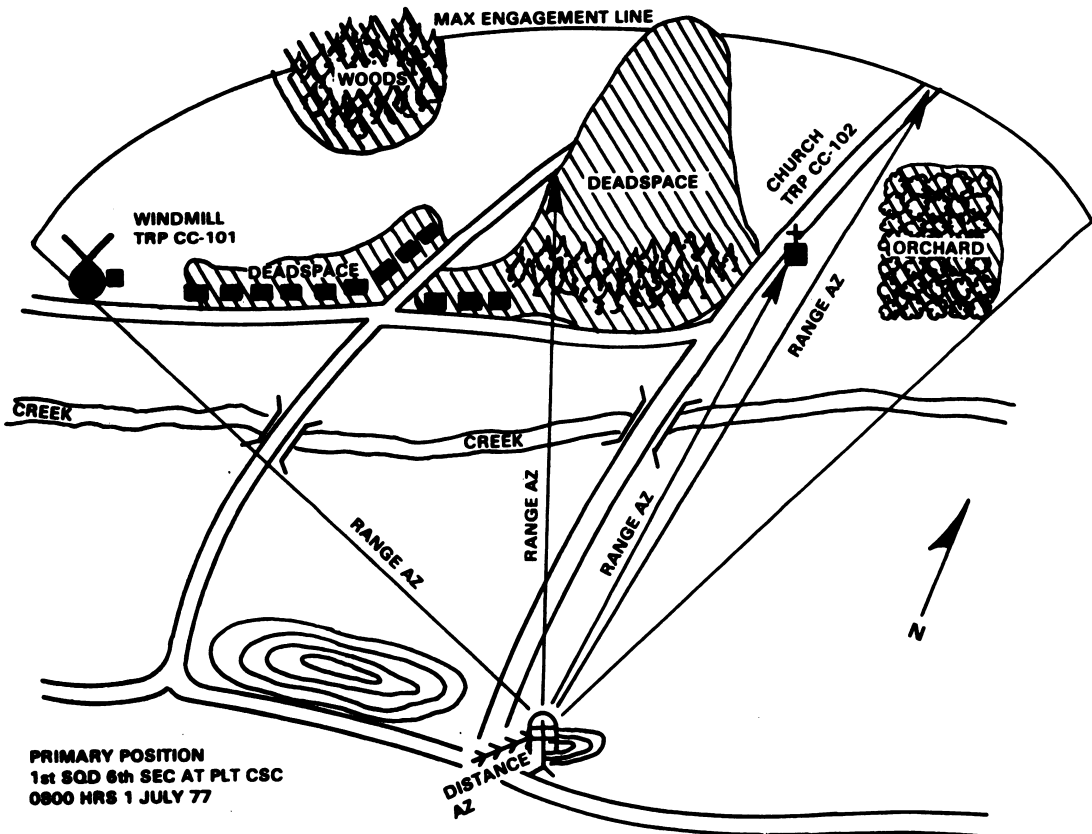


Figure 9

(7) Make two copies of each range card. Keep one copy at your firing position. The second copy will normally be picked up by your squad or section leader for preparation of fire plans and final coordination of fires.

REFERENCE:

None

071-317-3306

PERFORM IMMEDIATE ACTION PROCEDURES
FOR A DRAGON MISFIRE

CONDITIONS:

During daylight or darkness, in a field environment, with field clothing and combat equipment, given a Dragon tracker mounted on a field handler trainer and a misfire situation.

STANDARDS:

Within 1 minute, perform immediate action procedures IAW the performance measures below.

PERFORMANCE MEASURES:

If the Dragon fails to fire:

1. Immediately resqueeze the trigger and continue tracking the target for 15 seconds.
2. If the round still does not fire, cautiously feel the thermal battery (fig. 1).

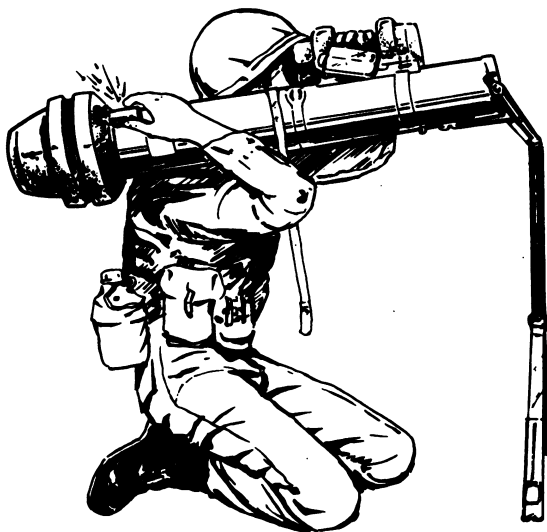


Figure 1

a. Simulate that the thermal battery is hot, and do the following:

(1) Remove the tracker from the round and place the round on the ground away from your firing site. Keep the round pointed toward the enemy; advise friendly troops in your vicinity of the misfire.

(2) Obtain a new round and mount the tracker on the new round.

(3) If possible, acquire previous target and continue with the mission.

b. Simulate that the thermal battery is cold, and do the following:

(1) Reseat the tracker on the round.

(2) Obtain target and attempt to fire again.

(3) If the round again fails to fire, cautiously feel the thermal battery.

(4) If the battery is still cold, remove the tracker from the round and place the round on the ground away from your firing site. Keep the round pointed toward the enemy; advise friendly troops in your vicinity of the misfire.

(5) Mount the tracker on another round and continue with your mission.

(6) If the second round also fails to fire, cautiously feel the thermal battery. If the battery is cold, the tracker is probably defective.

(7) If another tracker is available, replace the tracker and continue with the mission using previously unfired rounds.

REFERENCE:

TM 9-1425-484-10, Operator's Manual; Dragon Weapon System, M47, Apr 74 (chap 2, pages 2-0 thru 2-10, para 2-8b)

071-317-3307

CONSTRUCT A FIGHTING POSITION
(DRAGON/90MM RCLR)

CONDITIONS:

During daylight, given a sector of fire, a firing position, and a mission to construct the position.

STANDARDS:

Construct a fighting position that provides:

1. Coverage of the assigned sectors of fire.
2. Enough room to accommodate you when firing and preparing another Dragon round or reloading the 90mm RCLR.
3. Cover and protection from small-arms fire by means of natural or manmade parapets.
4. Concealment from observation that cannot be easily detected by a soldier 1,000 meters to the front using binoculars.

PERFORMANCE MEASURES:

1. Like any other weapon organic to the platoon, the Dragon and 90mm recoilless rifle can be employed from hasty or improved positions. A fighting position is a firing position sited and oriented to cover a sector of fire and constructed to accommodate the weapons system and its firer. See figure 1 for an example of a Dragon fighting position.

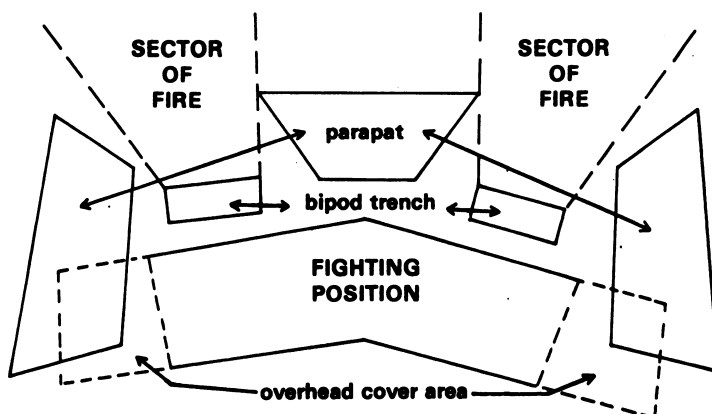


Figure 1

2. The use of special positions for each weapon system, even though they may provide an advantage in certain instances, should be carefully weighed in light of weapon signature and the surveillance capability of the enemy.

3. The construction sequence of a fighting position is as follows:

a. After receiving a sector of fire and firing location from your squad leader, prepare and site your weapon to cover the sector and, as required, clear fields of fire. Clear only what is absolutely necessary. Camouflage the position using available materials. Improve your position as time permits.

b. In preparing fighting positions for the Dragon, remember:

(1) The launcher must be at least 6 inches above the ground.

(2) Always strive to tie the position into natural cover and concealment, such as bushes, trees, logs, etc.

(3) Positions for the 90mm recoilless rifle can be constructed like Dragon positions. However, since it takes two men to keep the weapon in operation, the hole will have to be a little longer when firing to the right side of the frontal protection. This lets the assistant gunner work from the right side of the weapon.

REFERENCES:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77

071-317-3308

PERFORM EMERGENCY DESTRUCTION PROCEDURES

CONDITIONS:

Given a simulated or combat situation in which capture of yourself or your weapon is imminent, a destruction order, and any of the following antiarmor weapons systems together with entrenching tool, axe, sledge hammer, thermite grenade, gasoline, or demolitions (C4 or dynamite).

1. A TOW launcher (complete) with missile (live or inert).
2. A 106mm RCLR (complete) with ammunition (live or inert).
3. A 90mm RCLR (complete) with ammunition (live or inert).
4. A Dragon (complete).
5. A LAW (live or inert).

STANDARDS:

1. Give the priority of destruction for the five weapon systems cited above, and give the priority of destruction for components of each weapon.

2. Explain the methods of destruction for each weapon, its components, and ammunition.

PERFORMANCE MEASURES:

1. Priority of destruction according to the weapons system and components of each system:

a. TOW:

- (1) Missile guidance system.
- (2) Optical/thermal sight.
- (3) Traversing unit.
- (4) Tripod.

- (5) Batteries.
- (6) Launch tube.
- b. 106mm RCLR:
 - (1) 106mm RCLR gun tube.
 - (2) Caliber .50 spotter rifle.
 - (3) Sight.
 - (4) Tripod base legs.
- c. 90mm RCLR.
 - (1) 90mm RCLR gun tube.
 - (2) Sight.
- d. Dragon: Tracker.
- e. LAW: Entire weapon.

2. Methods of Destruction:

IMPORTANT NOTE: Whenever possible, expend ammunition by firing it at the enemy.

a. Mechanical Means. Destroy electrical components and sights by using entrenching tools, axes, sledge hammers, etc.

WARNING. Do not destroy ammunition by mechanical means.

b. Gunfire. Destroy electrical components and sights using small arms.

WARNING. Do not destroy ammunition by small-arms fire.

c. Burning. Destroy all weapons system components and ammunition by using thermite grenades, gasoline, or other flammable material.

d. Explosives. Destroy all weapons system components and ammunition by using double primed explosive charges. See FM 5-25 for more information. (This method must be supervised by your fire team leader or squad leader.)

REFERENCE:

None

INTRODUCTION TO THE TOW

TOW stands for Tube-launched, Optically-tracked, Wire-command-link guided missile. The system is a crew portable, heavy antiarmor weapon designed to attack and defeat armored vehicles, and other targets such as field fortifications. It has a minimum range of 65 meters and a maximum range of 3,000 meters (3,750 meters with the extended-range missile). The launcher weighs 189 pounds assembled and consists of the following seven major components:

1. Launch tube.
2. Traversing unit.
3. Missile guidance set.
4. Daysight tracker.
5. Tripod.
6. Battery assembly (2).
7. AN/TAS-4 nightsight.

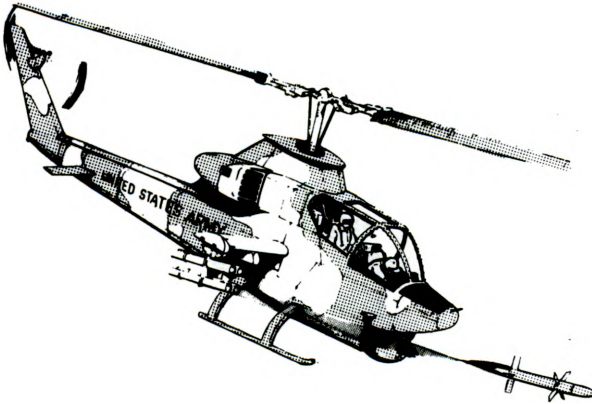
NOTE: The launcher with an encased missile weighs 243 pounds.

TOW WEAPON SYSTEM DATA

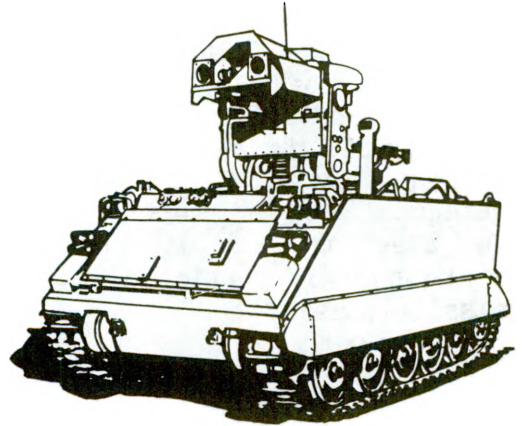
ITEM	LENGTH (in)	WIDTH (in)	HEIGHT (in)	WEIGHT (lb)
Launcher, tubular GM (deployed, max)	80	64	48	171
Launch tube	12	9	8	11
Traversing unit	13	22	21	53
Missile guidance set (including battery assembly)	16.0	16.0	12.0	54
Daysight tracker	22	13	14	32
Tripod (retracted, laying down)	43	13	13	21
Battery assembly	15.5	4.8	7.0	21
Encased missile	50.5	Diameter 8.6		55.4
AN/TAS-4 nightsight	19.5	8.8	8.0	18

The missile can be launched from the ground or from its primary mode on either the M113A1 armored personnel carrier (APC); M151A2 1/4-ton truck or M274A5 1/2-ton weapons carrier; or M901 improved TOW vehicle (ITV). In addition, the TOW can be fired from the AH1S TOW Cobra attack helicopter.

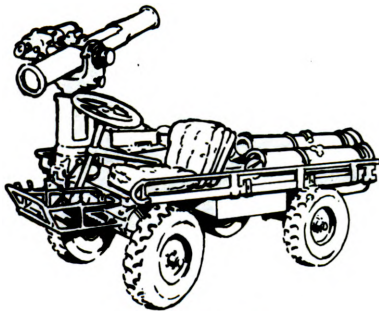
The TOW weapon system organic to the mechanized infantry battalion is mounted on the M113A1 APC or the M901 ITV. The TOW weapon systems in airborne infantry and infantry battalions are mounted on M151A2 1/4-ton trucks. The airmobile infantry battalions mount their TOW weapon systems on M274A5 1/2-ton weapon carriers (Mule).



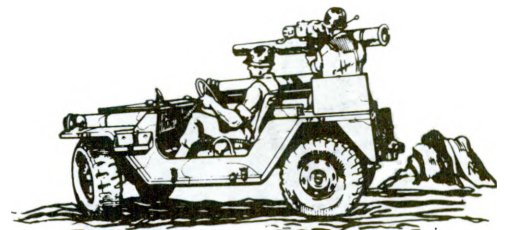
AH1S TOW COBRA
attack helicopter.



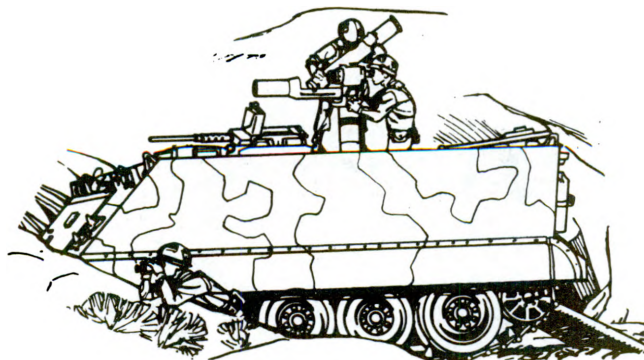
M901 ITV.



M274A5
1/2-ton weapon carrier.



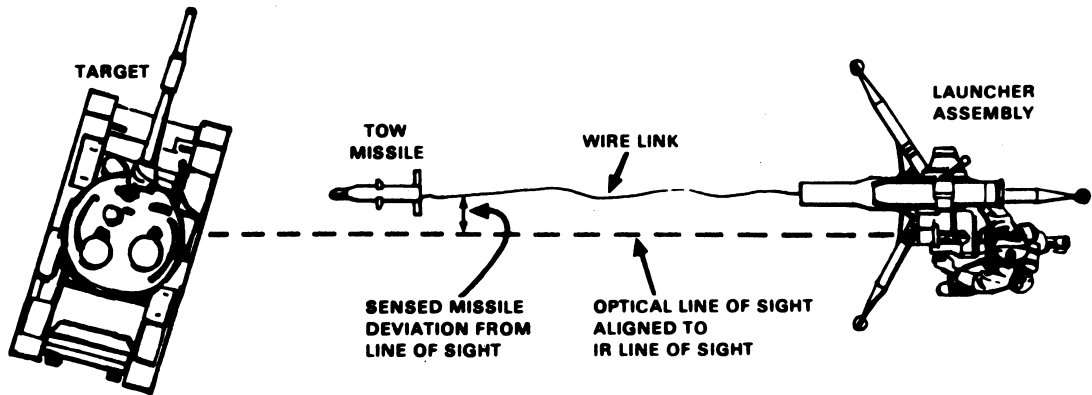
M151A1
1/4-ton truck.



APC M113A1

The TOW will operate in all weather conditions in which the gunner can see the target through the 13-power daysight tracker or the 3-power AN/TAS-4 nightsight. The operating temperature range is from -25° to $+140^{\circ}$ F (-32° to $+60^{\circ}$ C); the launcher will operate at altitudes up to 3,050 meters (10,000 feet).

The TOW is very reliable and has a very high first-round hit probability. The system operates (fig. 1) by the gunner keeping the crosshairs of his optical sight centered on the visible mass of the target. Any difference between the line-of-sight and the flight path of the missile is detected by the IR tracker and analyzed by the missile guidance set. Steering commands are then developed in the missile guidance set and sent through the command-link wires to the missile. The steering commands correct the flight path of the missile and guide it to the aim portion of the target. This is a continuous process until missile impact.



WARNING. The backblast area for the TOW is 75 meters (50 meters danger area and 25 meters caution area).

071-316-2500

ASSEMBLE THE TOW LAUNCHER

CONDITIONS:

Given a disassembled TOW launcher and a direction of fire.

STANDARDS:

Within 2 minutes, assemble the launcher IAW the performance measures.

PERFORMANCE MEASURES:

1. LAUNCHER SITE. When assembling the launcher, the site for the tripod should not slope more than 30° . Slopes of more than 30° make leveling the tripod very difficult.

2. SETTING UP THE TRIPOD.

a. Place the tripod on the ground so that two legs are facing in the direction of fire (grooved coupling clamp locking handle to the front). Release the friction locks on each leg by pushing the friction locking handle up (fig. 1).

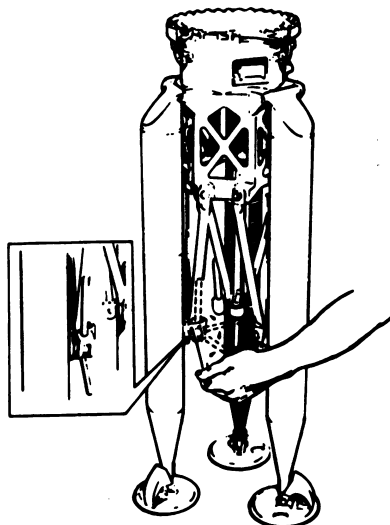


Figure 1. Releasing friction locks.

b. Starting with the rear leg, press the detent stop lever toward the leg until it disengages and release it as you pull the leg out (fig. 2). As you pull the leg out, the detent stop should engage at the first detent stop position. Do each leg in the same manner.

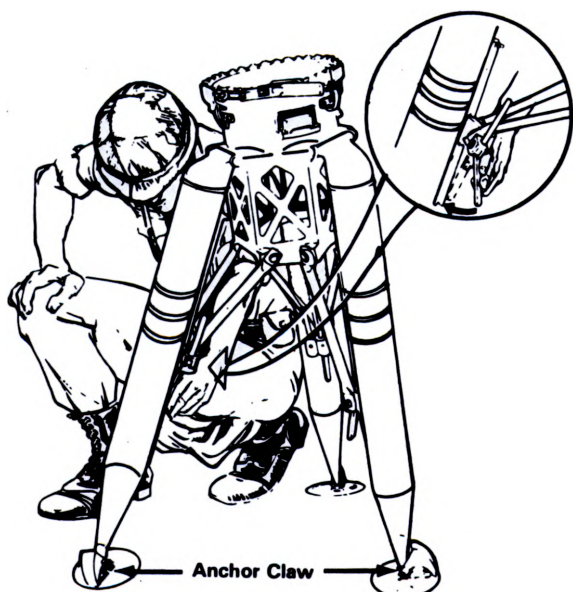


Figure 2. Disengaging the detent stop lever.

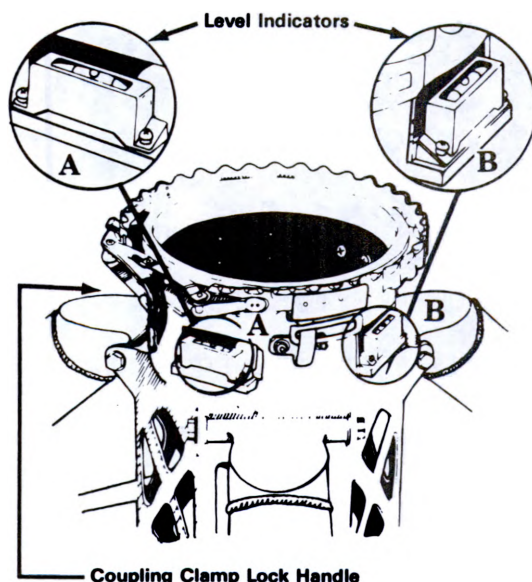


Figure 3. Level indicator with bubbles centered.

c. Check your level indicators (fig. 3). If the bubble is not between the indexing marks, you must adjust the legs. Do this by again pushing in on the detent stop lever to center one bubble and then the other. (Use the friction lock to lock the legs between detect positions if required while leveling.)

d. Lock all friction locks (return to down position) when the tripod is level.

e. Step on each anchor claw to insure a firm base (see fig. 2). Place a stake through the hole in the foot pad if additional stability is required. Recheck your level indicators.

3. INSTALLING THE TRAVERSING UNIT (figs. 3 and 4).

NOTE: Coil should be placed back into traversing unit when it is dismounted from its organic carrier.

- a. Open the coupling clamp lock handle on the tripod (fig. 3).
- b. Pull the coil cord from inside the traversing unit and extend it.
- c. Pick up the traversing unit and pass connector end of coil cord through body of tripod.
- d. Center traversing unit over tripod with the azimuth lock positioned opposite the direction of fire.
- e. Lock the coupling clamp and recheck the level indicators, relevel as necessary.

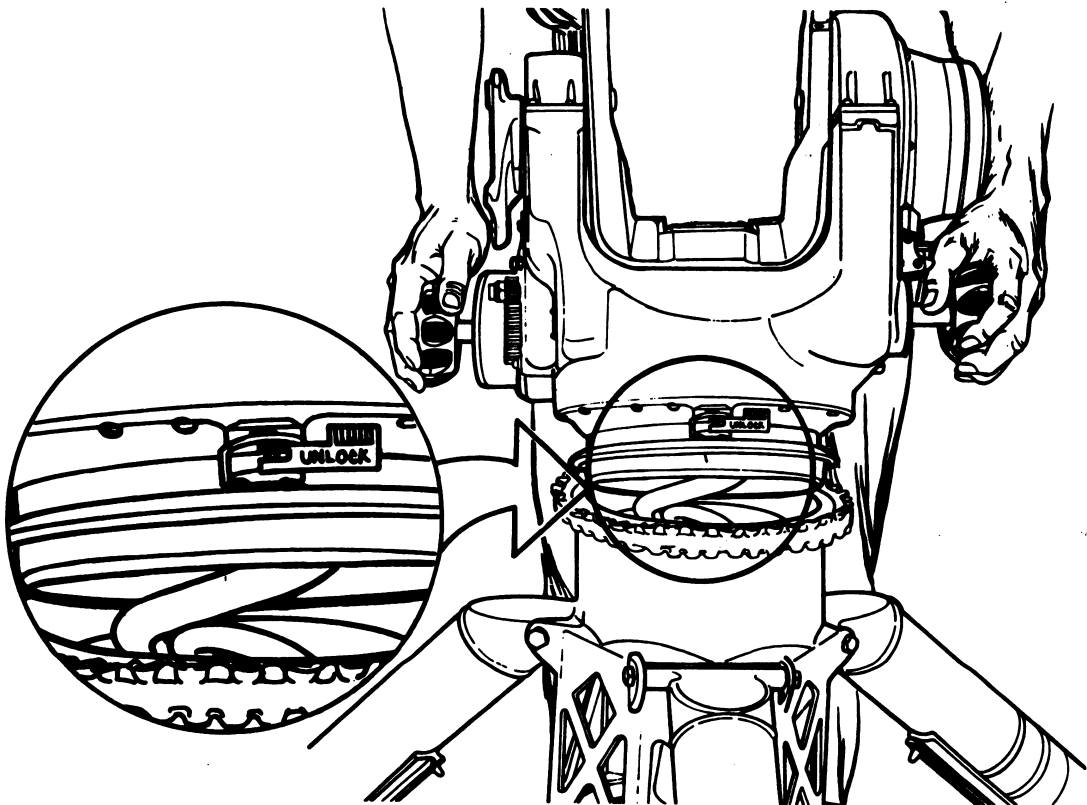


Figure 4. Installing the traversing unit.

4. INSTALLING THE DAYSIGHT TRACKER.

a. Pick the tracker up using the holes in the mounting bracket (fig. 5).

b. With the locking latch assembly all the way down, aline the top of the tracker mounting bracket over the top of the boresight plate on the traversing unit and lower the tracker into position against the boresight plate (fig. 6).

c. Lift up on the locking latch assembly to secure the tracker (fig. 7). (Do not let go until you are sure it is secure.)

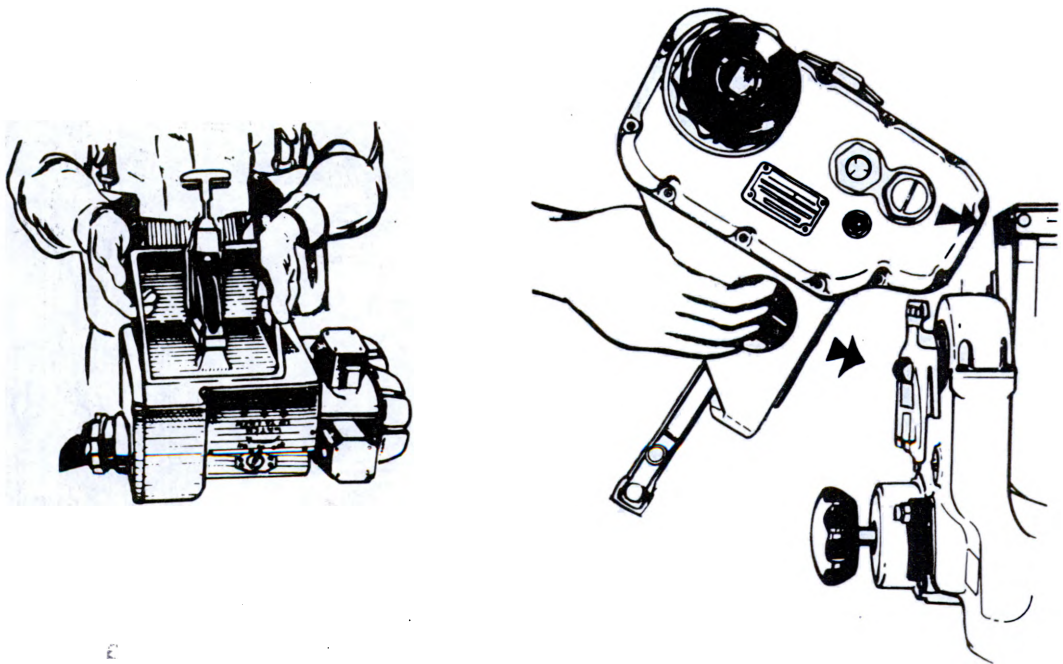


Figure 5. Proper handling of the daysight tracker.

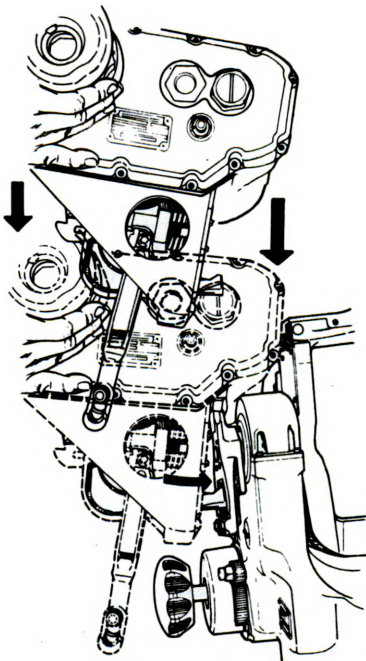


Figure 6. Alinement of the daysight tracker on the boresight plate.

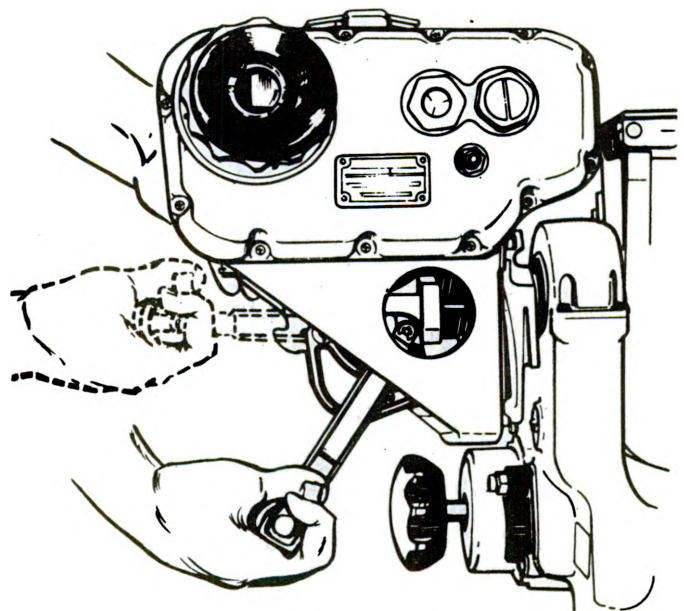


Figure 7. Securing the daysight tracker onto the boresight plate.

5. INSTALLING LAUNCH TUBE.

- a. Raise the forward end of the launch tube slightly and place the mounting lugs in the trunnion fittings (fig. 8).
- b. Hold the launch tube latch up, and lower the forward end of the launch tube (fig. 9).
- c. Secure the launch tube with the latch.

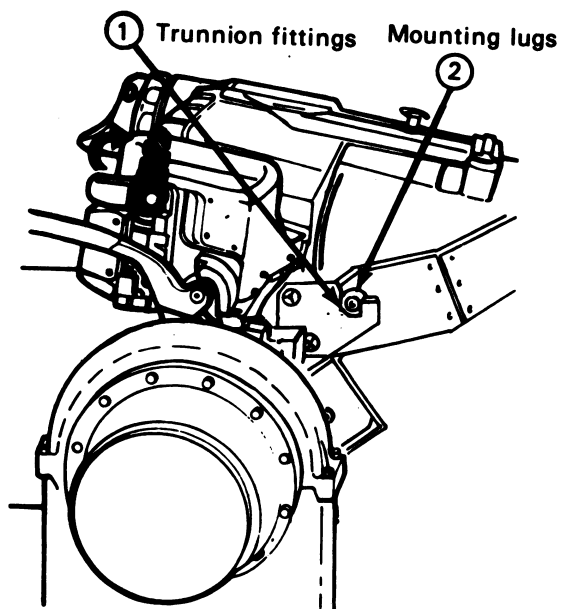


Figure 8. Installing launch tube.

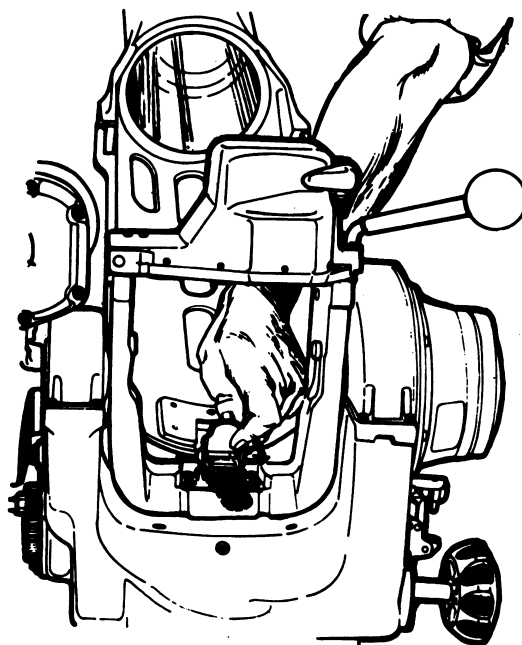


Figure 9. Launch tube latch.

6. SETTING UP MISSILE GUIDANCE SET.

a. Remove the cover from the missile guidance set. Install a battery assembly in the battery well, insuring that the electrical connectors are properly aligned before seating the battery (fig. 10). Tighten the six wingnut fasteners to secure it.

b. Pull the coil cord from under the traversing unit and aline the indexing lines on the connecting plug and the J1 connector (fig. 11). Push down to seat the connecting plug on the J1 connector and tighten the locking nut.

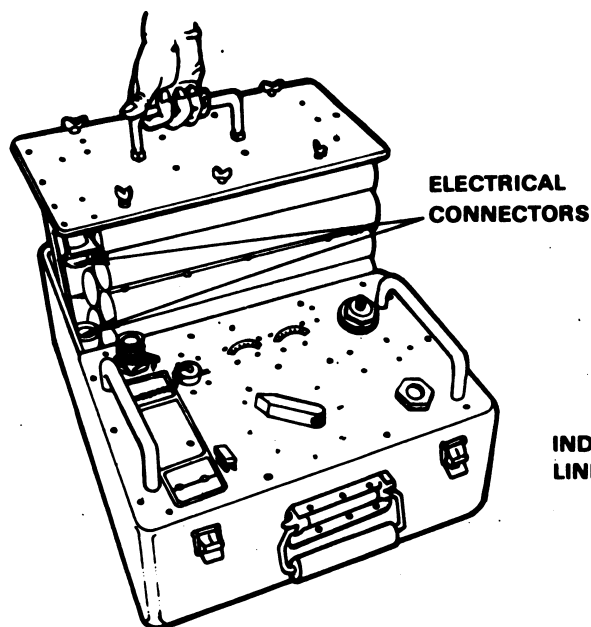


Figure 10. Installing battery assembly.

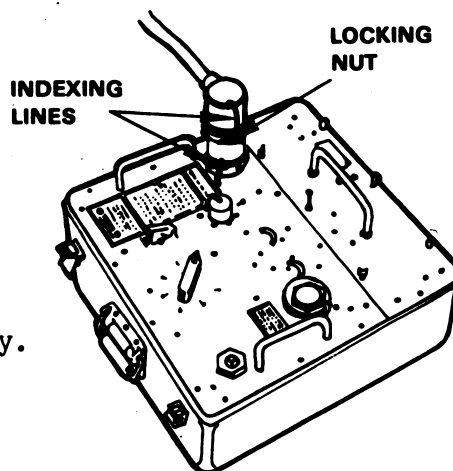


Figure 11. Alinement of indexing lines and locking nut.

REFERENCES:

TEC Lesson 948-071-0020-F, Introduction to Antiarmor Weapons
 TEC Lesson 948-071-0021-F, Preparing the TOW for Ground Operation,
 Part I

071-316-2501

PERFORM OPERATOR MAINTENANCE
ON A TOW LAUNCHER

CONDITIONS:

Given a TOW launcher, a camel's-hair brush, lens tissue, orange wood stick, toluol solvent, ethyl alcohol, cleaning rags, mild detergent, warm water, and TM 9-1425-470-12.

STANDARDS:

1. All preventive maintenance checks and services will be conducted IAW table 3-1 of TM 9-1425-470-12.

2. All defective components/deficiencies are detected and reported.

PERFORMANCE MEASURES:

1. Conducting a Visual Inspection. During the visual inspection, the TOW launcher is completely assembled. Table 3-1 of TM 9-1425-470-12 gives step-by-step procedures for performing the visual inspection. After completion of the visual inspection, the self-test is performed to insure the serviceability of the launcher. You should report to your squad or section leader immediately any deficiency/shortcoming you cannot correct so the system can be repaired when time or the situation permits. In combat, it may be necessary to operate a system with some deficiencies. Normally, if all the components are present and the launcher passes the self-test, it will fire a missile.

2. Cleaning Tips:

a. Metal Parts. Use dry, clean wiping rags to remove dust, dirt, grease, moisture, or other foreign matter from the launcher components. If the foreign matter cannot be removed using dry wiping rags, dampen a rag with alcohol or solvent and gently wipe the area.

.....
[WARNING: Toluol solvent is toxic and flammable. Keep away from heat and open flames. Use only in a well-ventilated area. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with the skin.]
.....

Ethyl alcohol is flammable. Keep all flammable cleaning materials away from open flames. Failure to do so could result in injury or death.

b. Rubber Parts. Clean rubber parts using a mild detergent. Dry with a clean, absorbent wiping cloth. Do not get alcohol or solvent on rubber parts or seals.

c. Glass Surfaces. Remove loose particles of dust and lint with a camel's-hair brush. Then wipe in a circular motion using lens tissue dry or moistened with ethyl alcohol. Use a small stick or swab wrapped with lens tissue to remove matter which remains. Starting at the center of the lens, swab in an expanding circular motion until the entire surface is clean.

(1) Do not clean glass surfaces of the daysight tracker with rags or other materials that might scratch and thereby degrade system performance.

(2) Use only authorized lens tissue to clean optical surfaces. Do not use the silicone-treated paper that is used for eyeglasses.

(3) Avoid touching optical surfaces with fingers.

d. Launch Tube. Use a dry cloth to remove loose dirt, dust, or debris from bore of launch tube; flush off caked mud with clean water.

e. Battery Compartment. Remove battery assembly from missile guidance set; clean and dry battery compartment.

f. Battery Assembly. Clean battery assembly with a clean, damp cloth or plastic brush. Wipe dry with a clean wiping rag. White, powdery deposits on the cells are caused during charging operations. They are harmless but should be removed to prevent buildup.

g. Cloth and Plastic. Flush caked mud, dirt, dust, and other debris from the shroud and strap assemblies using clean water. Scrub the outside of the shroud assembly and the strap assembly, using a mild detergent, warm water, and a scrub brush or rag. Use a clean, damp rag to clean the lining of the shroud assembly. Dry the lining and all metal parts of both assemblies using a clean, absorbent cloth.

h. Cleaning Procedures for Cold Weather.

(1) If the temperature is below 32° F (0° C), add glycerin to the cleaning water. This will stop the water from freezing.

(2) Apply deicer to glass surfaces to remove ice. Pat the surface with a clean, absorbent wiping rag. DO NOT RUB. Clean with lens tissue when the surface is dry.

(3) Avoid breathing on the optical sight.

i. Spot Painting. Use quick-drying semigloss enamel No. 24087 for all olive drab and No. 27038 for all black front panels. The surfaces must be clean and free from rust, corrosion, dirt, flaking, and other foreign materials before painting.

j. Replace the Missile Guidance Set (MGS) Desiccant.

(1) Check the humidity indicator on the MGS. If the 40 percent sector of the humidity indicator is white or pink, replace the desiccant.

(2) To replace the desiccant, remove the cover from the desiccant container (upper right corner of MGS). Remove the old desiccant bag and discard. Insert a new desiccant bag and replace the container cover.

REFERENCES:

TEC Lesson 948-071-0027-F, Maintenance of the TOW System

071-316-2502

CONDUCT A SYSTEM SELF-TEST
AND PREOPERATION INSPECTION OF A
TOW LAUNCHER AND ENCASED MISSILE

CONDITIONS:

Given an assembled ground- or vehicle-mounted TOW launcher and an encased missile, and TM 9-1425-470-12.

STANDARDS:

1. Conduct a system self-test of the TOW launcher when any of the following conditions exist:

a. Before and after installation of the TOW on its organic carrier.

b. Daily, once the system is installed on the carrier.

c. Any time you change locations using the extended travel configuration.

2. Conduct a preoperation inspection of the encased missile/missile simulation round prior to firing IAW performance measures.

3. All defective components are reported.

PERFORMANCE MEASURES:

1. The system self-test.

NOTE: The self-test uses battery power, so perform it rapidly.

a. To conduct the system self-test, hold the "TEST OPERATE" switch in the "TEST" position and rotate the "SELF-TEST" switch to each of the seven test positions when performing the actions in table 1.

b. The elevation and azimuth meters on the missile guidance set, which indicate the operational condition of the various components of the launcher, will register either in-band or out-of-band (fig. 1). An in-band reading indicates a component is functioning properly, and an out-of-band reading indicates a component is not functioning properly and corrective action is required.

c. Perform the actions specified in table 1 for each of the seven positions. The table lists the sequence, normal meter reading, and appropriate corrective action if a normal reading is not obtained.

d. If corrective action is performed, other than boresighting, the whole self-test must be repeated.

TABLE 1
PROCEDURES FOR SYSTEM SELF-TEST

STEP	PROCEDURE	NORMAL INDICATIONS		CORRECTIVE ACTIONS FOR OTHER THAN NORMAL READINGS
		AZIMUTH METER	ELEVATION METER	
1	Set SELF-TEST switch to position 1.	In-band	In-band	1. Replace battery assembly and tag for recharging. 2. Replace missile guidance set if trouble remains.
2	Set SELF-TEST switch to position 2.	In-band	In-band	Replace missile guidance set.
	a. Release elevation lock and move launch tube UP ----- DOWN ----- LOCK ELEVATION LOCK		Moves Right Moves Left	1. Replace traversing unit. 2. Replace missile guidance set if trouble remains.
	b. Release azimuth lock and move launch tube. RIGHT ----- LEFT ----- LOCK AZIMUTH LOCK	Moves Right Moves Left		1. Replace traversing unit. 2. Replace missile guidance set if trouble remains.
3	Set SELF-TEST switch to position 3.	In-band	In-band	Replace missile guidance set.
4	Set SELF-TEST switch to position 4.	In-band	In-band	Replace missile guidance set.
5	Set SELF-TEST switch to position 5. (TEST OPERATE switch must be in TEST position when SELF-TEST switch is rotated.)	In-band after 8 to 12 seconds.	Rotate in and out of band and then remain in-band after 8 to 12 seconds.	Replace missile guidance set.
6	Set SELF-TEST switch to position 6.	In-band	In-band	Replace missile guidance set.

Table 1. Procedures for system self-test

STEP	PROCEDURE	NORMAL INDICATIONS		CORRECTIVE ACTIONS FOR OTHER THAN NORMAL READINGS
		AZIMUTH METER	ELEVATION METER	
7	Set SELF-TEST switch to position 7. (Shade lens in sunlight to prevent needles from oscillating.) *Exact alignment with index mark is not necessary, but it should be aligned as close as possible without using excessive battery power.	a. Tracker motor in optical sight is running. b. *Center Index Mark.	*Center Index Mark.	a. Replace daysight tracker. b. Adjust focusing to +3 or more. c. Boresight by adjusting the azimuth and elevation knobs on the optical sight one at a time to obtain correct readings. WARNING IF THERE IS NO NEEDLE MOVEMENT ON THE AZIMUTH OR ELEVATION METER WHEN YOU ADJUST THE AZIMUTH OR ELEVATION KNOBS, RELEASE THE TEST OPERATE SWITCH. Get a good sight and do the test again. If there is still no movement, REPLACE THE MISSILE GUIDANCE SET (it was probably damaged by the first sight). Do not hook up the first optical sight with another missile guidance set. Turn it in to your maintenance support unit for checkout. d. If a normal reading cannot be easily obtained because the needles are fluctuating, release TEST OPERATE switch and preset boresight knobs to their center position.
8	After checking position 7, set SELF-TEST switch to position 1 to insure there is enough power to fire the next missile.	In-band	In-band	Same as step 1.
9	Release TEST OPERATE switch and rotate SELF-TEST switch to unmarked position.			

Table 1. Continued

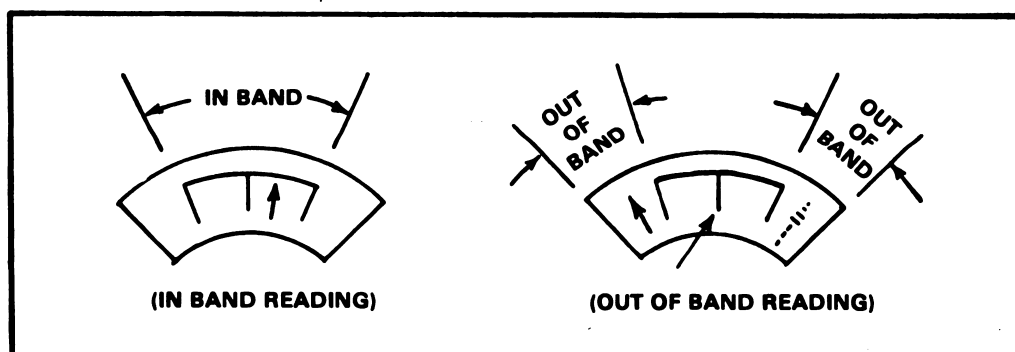


Figure 1. Elevation and azimuth meter.

WARNING. Do not conduct a system self-test unless the launcher is assembled. The traversing unit must be connected to the missile guidance set by the coil cord, and the daysight tracker must be properly mounted.

e. When checking position 7, boresight alinement of the daysight tracker and infrared tracker, aline the meter needles as closely as possible with the CENTER INDEX MARK.

(1) If they are not alined, adjust the boresight knobs on the optical sight, one at a time, to aline them. The elevation knob is located below the lens, and the azimuth knob is located to the right of the lens.

(2) In addition to checking position 7 (boresight) during the self-test, check it:

- After difficult cross-country movement.
- After a change in temperature of 10°.
- Every 4 hours.

2. Preoperation Inspection (table 2).

a. The preoperation inspection outlined in table 2 should be made periodically during operations as well as when the system is assembled.

b. The checks do not necessarily have to be performed in the order listed.

3. Inspection of an Encased Missile (table 2).

a. Check the outside of an encased missile for oil, dirt, grease, dents, gouges, punctures, or cracks.

b. Check the humidity indicator to insure that it is blue.

c. Insure that the dust cover is present.

d. Insure that the forward handling ring and quick release clamp are present and secured.

e. Insure that the indexing lugs are not damaged.

STEP	ITEM	PROCEDURE	NORMAL FUNCTION
1	Meter Lights	1. Push TEST OPERATE switch to test. 2. Release switch.	1. Lights illuminate. (Shade meters on sunny days.)
2	Reticle Light	1. Set reticle light switch to ON and focus crosshairs. 2. Return switch to OFF.	1. Crosshairs illuminate. (Cover lens during daylight.)
3	Trigger	1. Lift trigger protective cover. Depress and release trigger. 2. Close trigger protective cover.	1. Trigger springs back.
4	Bridge Clamp	1. Raise bridge clamp. 2. Check electrical connector. (Arming lever should not be raised.) 3. Close bridge clamp and lock. 4. Raise and lower arming lever. 5. Raise locking handle slowly to check wire cutter.	1. Bridge clamp operates with no binding. 2. Clean and free of dirt or grease. 3. Bridge clamp is tightly secured. 4. Electrical connector protrudes and retracts. 5. A click can be heard.
5	Launch Tube	1. Check breech and bore. 2. Alinement and security.	1. Free of foreign matter. 2. Lugs properly seated and launch tube latch locked.

Table 2. Preoperation inspection checklist.

NOTE: If you are in a live-fire training situation and the humidity indicator is pink, DO NOT FIRE THE MISSILE.

REFERENCES:

NONE

FM 31-11C-S

071-316-2503

LOAD, ARM, AND UNLOAD AN ENCASED TOW MISSILE

CONDITIONS:

You are the loader, given an assembled TOW launcher and an encased missile with the forward handling ring and the electrical connector dust cover installed, and a sector of fire. This is a team task; the gunner will assist the loader in the unloading procedures. For training, use missile simulation round instead of encased missile.

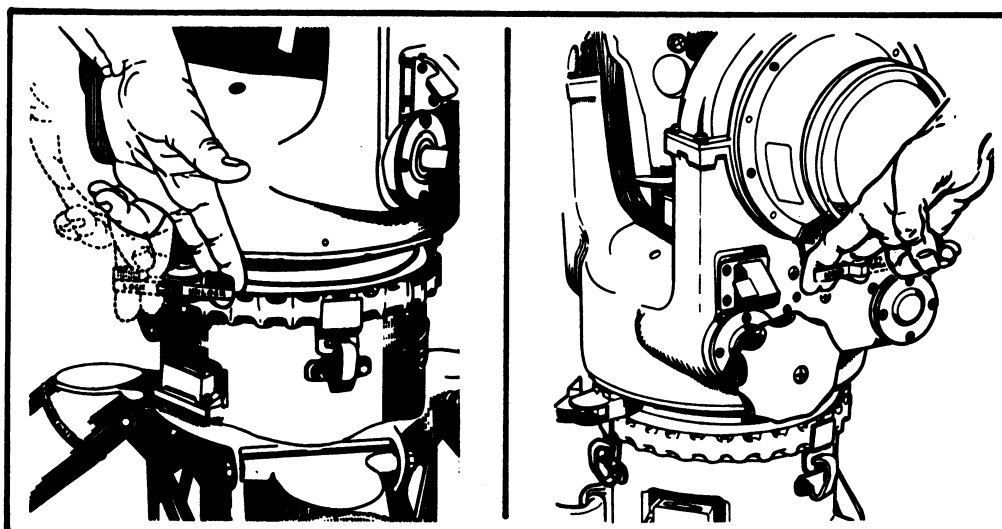
STANDARDS:

Load, arm, and unload the launcher IAW the performance measures.

PERFORMANCE MEASURES:

1. Loading the Launcher.

a. Lock the azimuth and elevation locks so that the launch tube is in the 80° down position (fig. 1).



a. LOCKING THE AZIMUTH LOCK

b. LOCKING THE ELEVATION LOCK

Figure 1. Locking the azimuth and elevation locks.

b. Raise the bridge clamp and insure that the trigger protective cover is down (fig. 2).

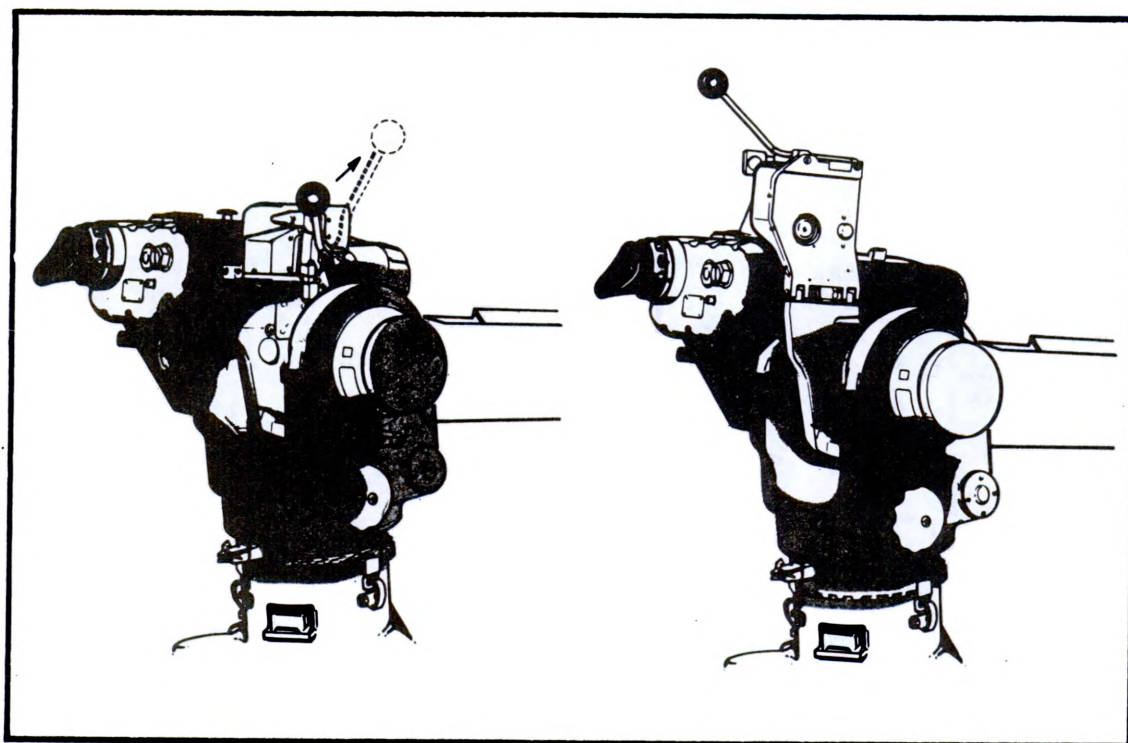


Figure 2. Raising the bridge clamp.

c. Check the encased missile prior to use for:

- (1) Gouges, punctures, or cracks.
- (2) Humidity indicator is blue.
- (3) Diaphragm is not ruptured.
- (4) Damaged indexing lugs.

d. Pick up the missile (do not lift by handling rings). Remove the dust cover, quick release clamp, and forward handling ring, in that order.

NOTE: For training purposes, check the humidity indicator before loading each round.

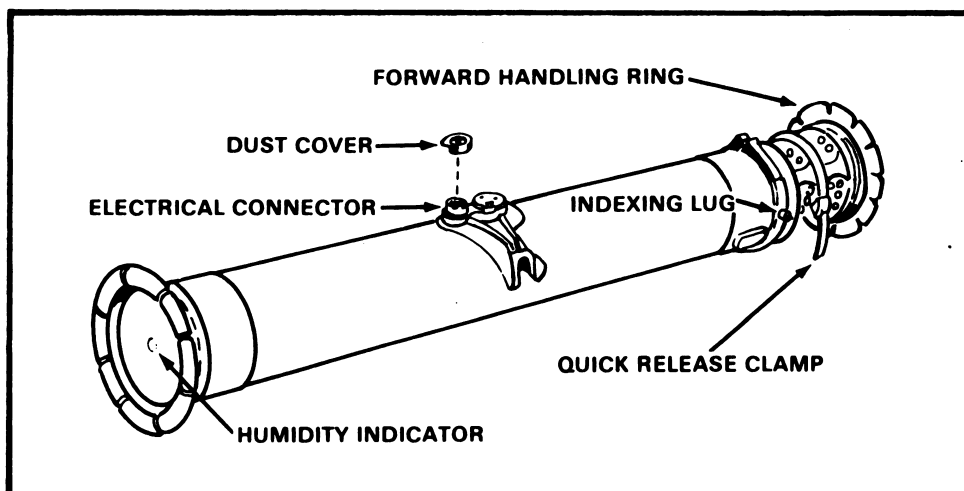


Figure 3. Encased TOW missile.

e. With the electrical connector facing up, hold the encased missile with the back end raised to about 45° and insert the indexing lugs into the launch tube indexing slots. Slide the encased missile forward and down until it is well seated (fig. 4).

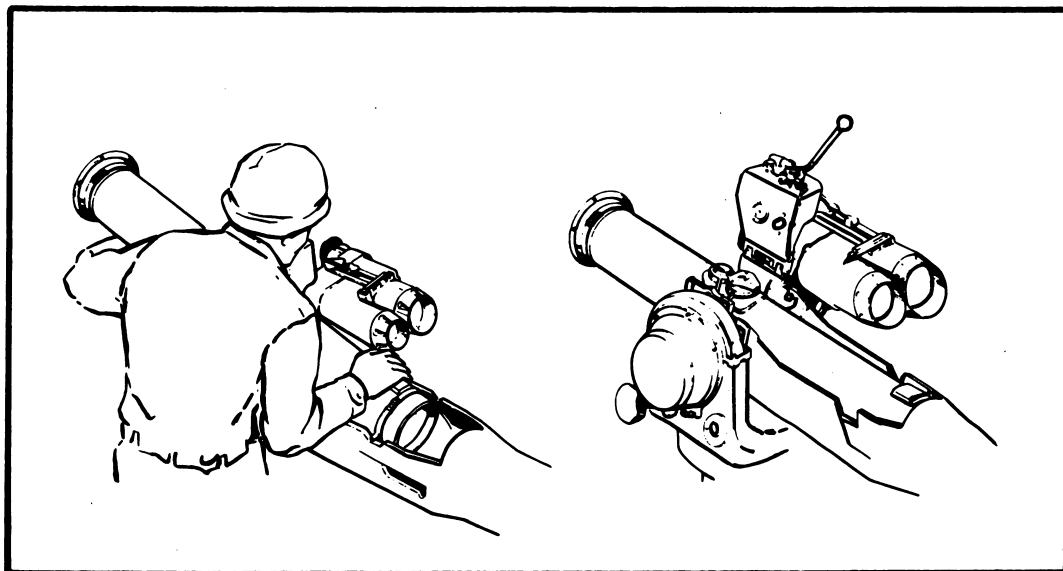


Figure 4. Seating the missile.

f. To lower the bridge clamp, push down on top of the bridge clamp with one hand and close the locking handle with the other hand (fig. 5).

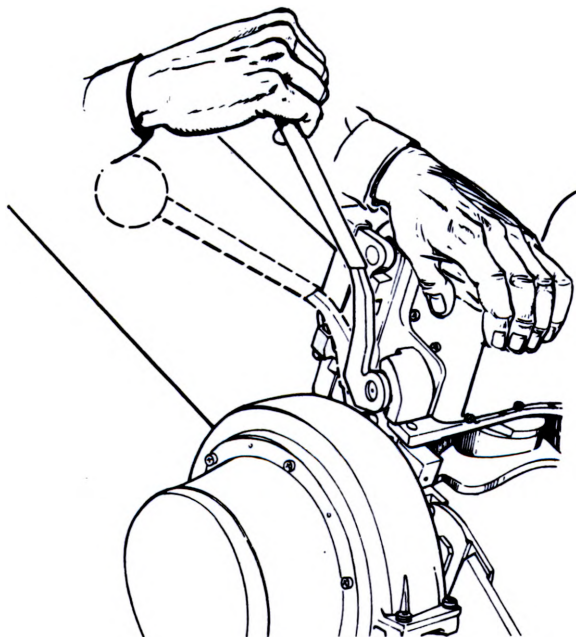


Figure 5. Lowering the bridge clamp.

2. Arming The Launcher.

- a. Clear the backblast area (fig. 6).
- b. Raise the arming lever (fig. 7).
- c. Give the gunner "UP."

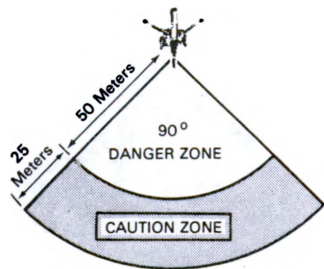


Figure 6.
Backblast area of the TOW.

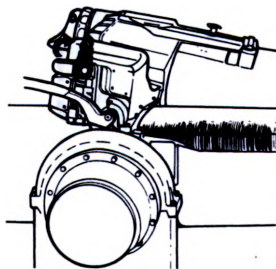


Figure 7.
Arming lever.

3. Unloading The Launcher. The procedures for unloading the launch tube depend on whether the missile was fired or not.

a. Missile Fired.

(1) Gunner.

(a) Lower the trigger protective cover.

(b) Lock the azimuth lock and the elevation lock as the launch tube is in the 8° down position.

(2) Loader.

(a) Raise the locking handle and open the bridge clamp. (This action will cut the command-link wires and turn off the motor in the sight.)

(b) Lift the back end of the missile container and remove it from the launch tube. (If the wires were not cut, cut them manually and then check the batter (self-test position 1).)

(c) Clear the launch tube of any foreign matter.

b. Missile Not Fired.

(1) Gunner.

(a) Lower the trigger protective cover.

(b) Lower the arming lever.

(c) Lock the azimuth lock and the elevation lock so the launch tube is held in the 8° down position.

(2) Loader.

(a) Raise the locking handle and open the bridge clamp.

(b) Lift the back end of the encased missile and remove it from the launch tube.

(c) Replace the forward handling ring and clamp and the electrical connector dust cover.

(d) Secure the encased missile in the missile rack. Tag missile with date opened, unit, and name.

FM 31-11C-S

REFERENCES:

TEC Lesson 948-071-0024-F, Loading, Tracking, and Firing the TOW

071-316-2504

 PERFORM IMMEDIATE ACTION FOR A TOW MISFIRE

CONDITIONS:

Given an assembled and loaded ground mounted TOW launcher (ready to fire), two encased missiles, and a misfire situation (missile fails to launch 1.5 seconds after trigger is pressed). This is a team task. You will be assisted by at least one other squad member.

NOTE: For training, use missile simulation round instead of encased missile.

STANDARDS:

Perform the immediate action in sequence that would allow a gunner to continue engagement of a target.

PERFORMANCE MEASURES:

1. Take immediate action procedures to eliminate the malfunction and continue the mission in the fastest and safest manner.
2. Always remember, when a misfire occurs, that it could be a delay in the firing circuits.
3. Immediate action procedures for a misfire. Listed below are the actions that the gunner and loader take in the event of a misfire.

Misfire Procedures

Gunner	Loader	Corrective Action
1. Press the trigger again.		If the missile fails to fire, perform step 2.
2. Alert the crew by saying "Misfire" and continue to track.	a. Check battery power (self-test position 1).	(a) Out-of-band reading: the loader replaces the battery. (b) In-band reading: the loader proceeds to step 2b.

Gunner	Loader	Corrective Action
3. Attempt to fire. (If missile fails to fire, call "Misfire").	b. Check coil cord connection to missile guidance set.	(a) Press down on coil cord connection, checking for proper seating.
		(b) Tighten coil cord connection to missile guidance set. Loader proceeds to step 2c.
	c. Check bridge clamp locking handle.	Insure bridge clamp is properly seated. Proceed to step 2d.
	d. Lower and raise the arming lever.	Give the gunner "UP". Gunner and loader perform steps 3 and 4.
5. Attempt to fire. (If missile fails to fire, call "Misfire").	4. Lower and raise arming lever.	Give the gunner "UP". Gunner performs step 5.
5. Attempt to fire. (If missile fails to fire, call "Misfire").		Gunner and loader perform step 6.
6. Close trigger protective cover. Place the launch tube in the 8 degree down position, locking the azimuth and elevation locks.	a. Lower the arming handle.	Proceed to step 7.

Gunner	Loader	Corrective Action
<p>7. Wait for fire command from squad leader.</p>	<p>b. Open the bridge clamp and remove the encased missile.</p> <p>c. Conduct a missile pre-op.</p> <p>d. Load another missile.</p> <p>Wait for fire command from squad leader.</p>	<p>Start a new mission.</p>

WARNING. Remain clear of front and rear of the launcher at all times.

SQT ADMINISTRATIVE INSTRUCTIONS:

This task may be tested on the SQT in the Hands-on Component (HOC). The soldier will be required to perform in the misfire procedures within 1 minute. There will not be a requirement to replace the battery.

REFERENCES:

TEC Lesson 948-071-0024-F, Loading, Tracking, and Firing the TOW

071-316-2505

DETERMINE IF A TARGET CAN BE ENGAGED BY TOW

CONDITIONS:

Acting as a TOW gunner, or squad leader, given a complete TOW launcher and binoculars.

STANDARDS:

1. As a TOW gunner, using the daysight tracker, specify whether a vehicle is engageable.
2. As a TOW squad leader, using binoculars, specify whether a vehicle is engageable.

PERFORMANCE MEASURES:

1. Using the daysight tracker.

a. You can use the daysight tracker to determine if you have enough time to engage a moving target (fig. 1).

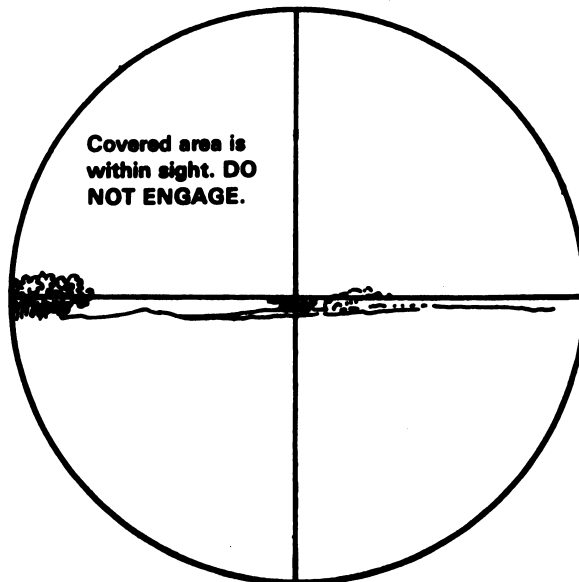


Figure 1

3-247

b. The daysight tracker is based on a vehicle speed of 35 kmph or 10 meters per second. This is expected to be the top cross-country speed of armored fighting vehicles.

c. Place the crosshairs on the center of visible mass of the target. If the area between the vertical crosshair and the edge of the sight, in the direction of travel, is clear of obstructions, the target can be engaged.

2. Using binoculars.

a. You can also use the binocular reticle to determine if there is enough time to engage target. This technique is usually used by squad leaders.

b. Place the zero tick marks of the horizontal line at the center of the target (as in figure 2 below). If the area between the target and the 50-mil tick mark, in the direction of travel, is clear of obstructions, the target can be engaged.

NOTE: The 50-mil tick marks are located at each end of the horizontal line and are labeled 5.

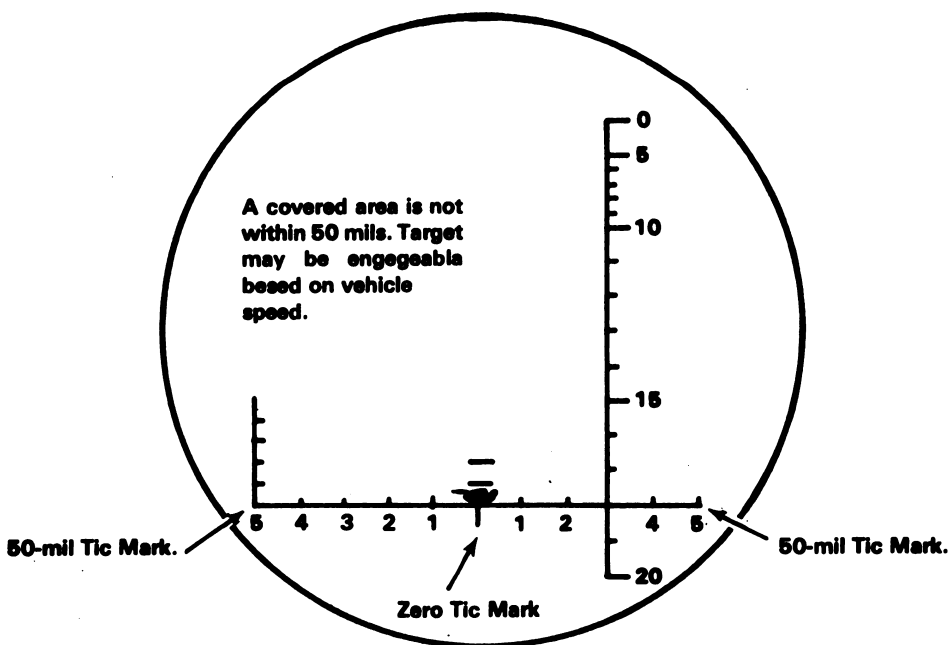


Figure 2. Binocular Sight Reticle.

c. The optical sight and binocular techniques are only estimates. Vehicles moving at speeds slower than 35 kmph may be engaged even though half the sight picture, or 50 mils in the binoculars, is not clear of obstructions. Proper training will enable you to make adjustments for different vehicle speeds.

REFERENCE:

None

071-316-2515

INSTALL THE TOW LAUNCHER AND ENCASED MISSILE
ON ITS ORGANIC CARRIER (FOR EXTENDED TRAVEL)

CONDITIONS:

Given a complete TOW launcher, an encased missile, and an organic TOW carrier.

NOTE: This task does not apply to ITV Crewmen.

STANDARDS:

Within 5 minutes, install and secure the launcher and missile in the extended travel configuration.

PERFORMANCE MEASURES:

1. Stowing the Launcher and Encased Missile on the M113.

a. To Stow the Launch Tube (fig. 1).

(1) Place the breech (rear) end of the launch tube in the forward support assembly above the missile racks so the support pin in the assembly fits in the locating hole in the launch tube.

(2) Push the muzzle end of the launch tube into position so it is against the stop on the rear assembly and secure the retaining strap.

b. To Stow the Tripod (fig. 1).

(1) Position the closed tripod on the triangular plate just forward of the missile racks and place the tiedown cap in the flange of the tripod.

(2) Secure the tiedown cap with the long strap attached to the triangular plate.

c. To Stow the Traversing Unit (fig. 2).

(1) Open the coupling clamp lock handle on the pedestal mount.

(2) Pick up the traversing unit.

(a) Pull the coil cord from inside the unit and extend it.

(b) Pass the coil cord through opening in the body of the pedestal mount.

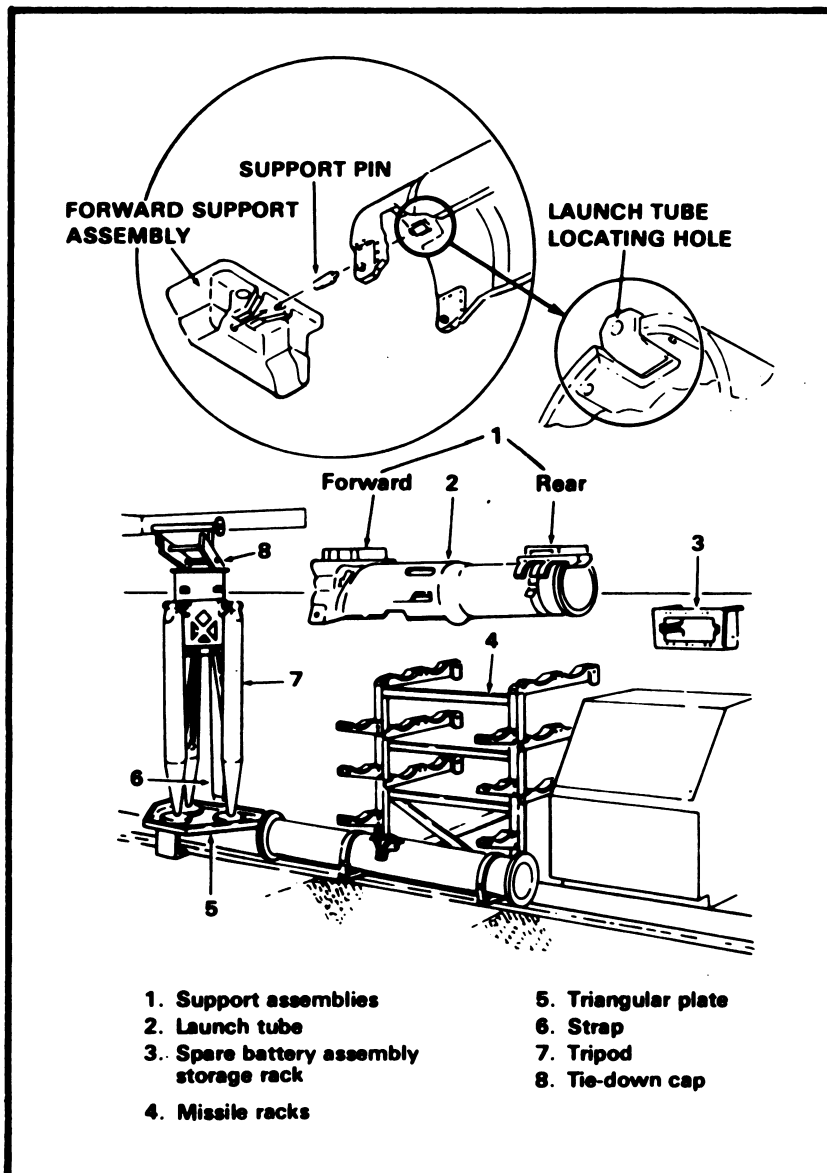


Figure 1

(3) Place traversing unit on pedestal mount and close the coupling clamp locking handle.

(4) Aline the indexing marks on the connector on the coil cord with the index mark on the pedestal mount receptacle.

(5) Connect the coil cord to the receptacle inside the pedestal mount.

(6) Lock the elevation lock.

d. Stowing the Daysight Tracker (fig. 2).

(1) Release the azimuth lock, if locked, on the traversing unit and rotate it about 45° to the left.

(2) Pick up the tracker using the holes in the mounting bracket.

(3) With the locking latch assembly all the way down, aline the top of the tracker mounting bracket over the top of the boresight plate on the traversing unit and lower the tracker into position against the boresight plate.

(4) Lift up on the locking latch assembly to secure the tracker. (Do not let go until you are sure it is secure.)

(5) Rotate the traversing unit back to the front and lock the azimuth lock.

(6) Insure that the reticle light switch is OFF.

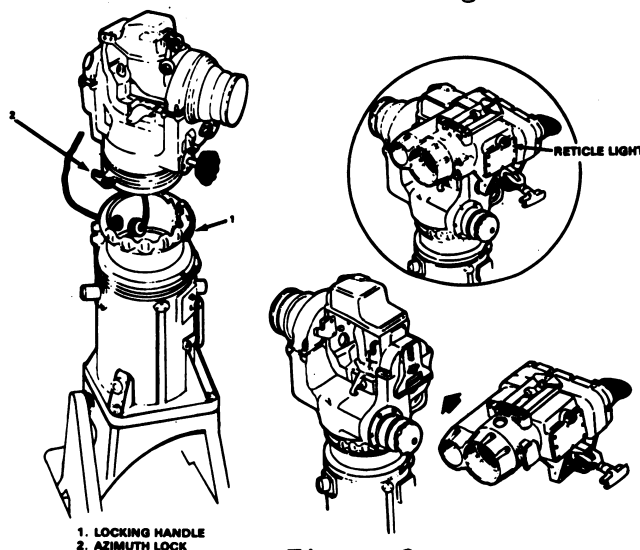


Figure 2

e. Missile Guidance Set (fig. 3).

(1) Remove the cover.

(2) Place the missile guidance set (battery to the right) in the bracket located on left wall of the vehicle. Secure with the four straps.

NOTE: Some carriers have the mounting brackets mounted so that the battery is to the front of the vehicle.

(3) Connect the pedestal cable to the J1 connector on the missile guidance set.

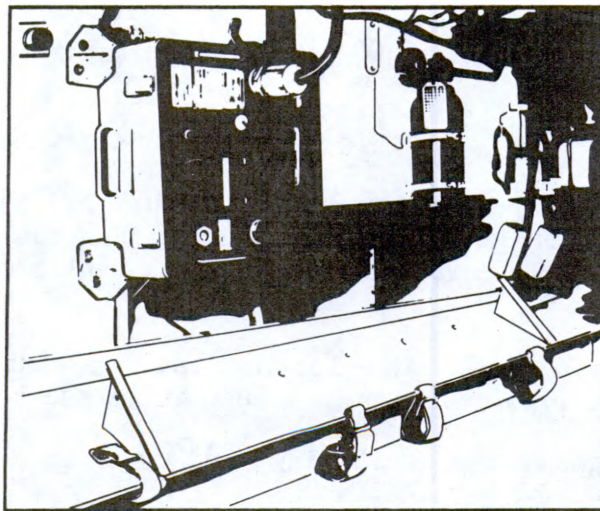


Figure 3

f. Spare Battery Assembly. Stow the spare battery assembly in the storage rack located to rear of the missile rack. Secure with the winged battery fasteners (fig. 1).

WARNING. Under normal conditions the battery assembly is nonhazardous; however, if a battery should be damaged, care should be taken to prevent any part of the body (especially the eyes) from coming in contact with the electrolyte since it is highly corrosive.

g. Missiles.

(1) Stow the missile with the nose end to the front of the vehicle and with electrical connectors up (fig. 1).

- (2) Load the bottom rack first and work up.
- (3) Secure each missile with the tiedown straps.
- 2. Stowing the Launcher and Encased Missile on the M151.
 - a. To Stow Equipment on the Firing Vehicle.
 - (1) To stow the traversing unit.
 - (a) Open the coupling clamp lock handle.
 - (b) Pick up the traversing unit.
 - 1. Pull the cord from inside the traversing unit and extend it.
 - 2. Pass connector end of coil cord through body of launcher mount.
 - (c) Mate traversing unit onto the launcher mount and secure in place with coupling clamp locking handle.
 - (d) Lock the elevation lock and azimuth lock.
 - (2) To stow the missile guidance set (MGS).
 - (a) Install the MGS in the elevated rack assembly with the battery assembly to the front.
 - (b) Secure the MGS with the tiedown straps.
 - (c) Pull the coil cord through the opening in the launcher mount.
 - (d) Aline the indexing lines on the coil cord connector and the J1 connector.
 - (e) Push down to seat the coil cord connector on the J1 connector and tighten the locking nut.
 - (3) To stow the daysight tracker.
 - (a) Pick up the tracker using the holes in the mounting bracket.

(b) With the locking latch assembly all the way down, align the top of the tracker mounting bracket over the top of the boresight plate on the traversing unit and lower the tracker into position against the boresight plate.

(c) Lift up on the locking latch assembly to secure the tracker.

(4) To stow the launch tube.

(a) Raise the forward end of the launch tube slightly and place the mounting lugs on the trunnion fittings.

(b) Hold the launch tube latch up and lower the forward end of the launch tube.

(c) Secure the launch tube with the latch and tap or lift upward to insure it is secured.

(5) Stowing the tripod.

(a) Unlock the two securing latches and raise the missile rack.

(b) Place the tripod with the footpads facing to the rear and two legs down.

(c) Secure the tripod with the two tiedown strap assemblies over the top leg.

(d) Lower the missile rack and secure both latches.

(6) Stowing missiles on firing vehicle.

(a) Place missiles in the rack with the nose end toward front of vehicle and electrical connectors facing up.

(b) Secure the missiles with the two tiedown straps.

b. Stowing Equipment on the 1/4-ton Missile Carrier.

(1) Stowing spare battery assembly.

(a) Stow the spare battery assembly in the storage rack between the driver and passenger seats.

(b) Secure with the winged battery fasteners.

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[WARNING. Under normal conditions the battery assembly is nonhazardous; however, if a battery should be damaged, care should be taken to prevent any part of the body (especially the eyes) from coming in contact with the electrolyte since it is highly corrosive.
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(2) Stowing missiles.

(a) Before loading, check and determine if both seats are adjustable. If so, slide both to a forward position. If not, remove rear holddown pin and raise seats.

(b) Remove ball lockpin from right No. 2 saddle. Swing saddle to an upward position.

(c) Install encased missile in lower forward position with forward end to right side of vehicle with the electrical connector up.

(d) Secure the encased missile with tiedown straps on left and right sides of vehicle.

(e) Return right No. 2 saddle to normal position and secure with ball lockpin.

(f) Load remaining encased missiles as above (steps (c) and (d)) from front to rear.

REFERENCES:

TEC Lesson 948-071-0025-F, The TOW/APC System
TEC Lesson 948-071-0026-F, The TOW 1/4-Ton System

FM 31-11C-S

071-316-2516

DETERMINE TOW FIRING LIMITATIONS

CONDITIONS:

Given a ground- or vehicle-mounted TOW weapon system, a firing position, and a sector of fire.

STANDARDS:

Explain each of the TOW firing limitations listed below:

1. Over water.
2. From a carrier.
3. Over electrical wires.
4. In windy conditions.
5. Through smoke and fire.
6. From bunkers and buildings.
7. Clearance requirements.

PERFORMANCE MEASURES:

1. Firing Over Water.

a. Firing across bodies of water wider than 1,000 meters can reduce the range of the TOW. Signals being sent through the command-link wires are shorted out when a large amount of wire is submerged in water. If the range is less than 1,000 meters, there is no effect on the missile's range. A TOW position should be as high above, and as far back from, the water as the tactical situation will allow. Analyze your sector as soon as you occupy your position to determine limiting effects of water.

(1) To determine how much water you are capable of firing across, you must first determine how high above water your firing position is (in meters). Then determine how high above water your target will be (in meters). A meter is approximately 3.3 feet.

(2) Then go to the chart that corresponds to the missile you are using: regular-range chart (fig. 1) for 3,000-meter missiles, and extended-range chart (fig. 2) for 3,750-meter missiles.

(3) Find the number on the left side of the chart that corresponds to the height of your launcher above water. Place one end of a straightedge on the tick mark beside that number.

(4) Find the number on the right side of the chart that corresponds to the height of the target above water. Place the other end of the straightedge on the tick mark beside that number.

(5) Read the number at the exact location where the straightedge crosses the center line. You may have to estimate if the straightedge crosses between two numbers. This number is the number of meters of water you can fire over.

b. If you know the water you are firing over is wider than 1,000 meters, you can determine how far your missile will travel.

(1) First, you must determine how far your launcher is from the water (in meters). (See example, step A.)

(2) Then add 1,600 meters. The missile can travel at least the distance from your launcher to the water plus 1,600 meters. (See example, step B.)

(3) Next, determine how high your launcher is above water (in meters). (See example, step C.)

(4) Then determine how high your target will be above water (in meters). (See example, step D.)

(5) Add these two together and multiply by 60. (For every meter that your launcher or target is above water, you can add 60 meters to the distance that the missile can travel.)

(6) Add total in step E to total in step B.

(7) After you have completed steps A through F, you will know the maximum engagement range.

EXAMPLE:

You have determined your launcher is 500 meters from a lake that is wider than 1,000 meters. Your launcher is 5 meters above water and your target is 6 meters above water.

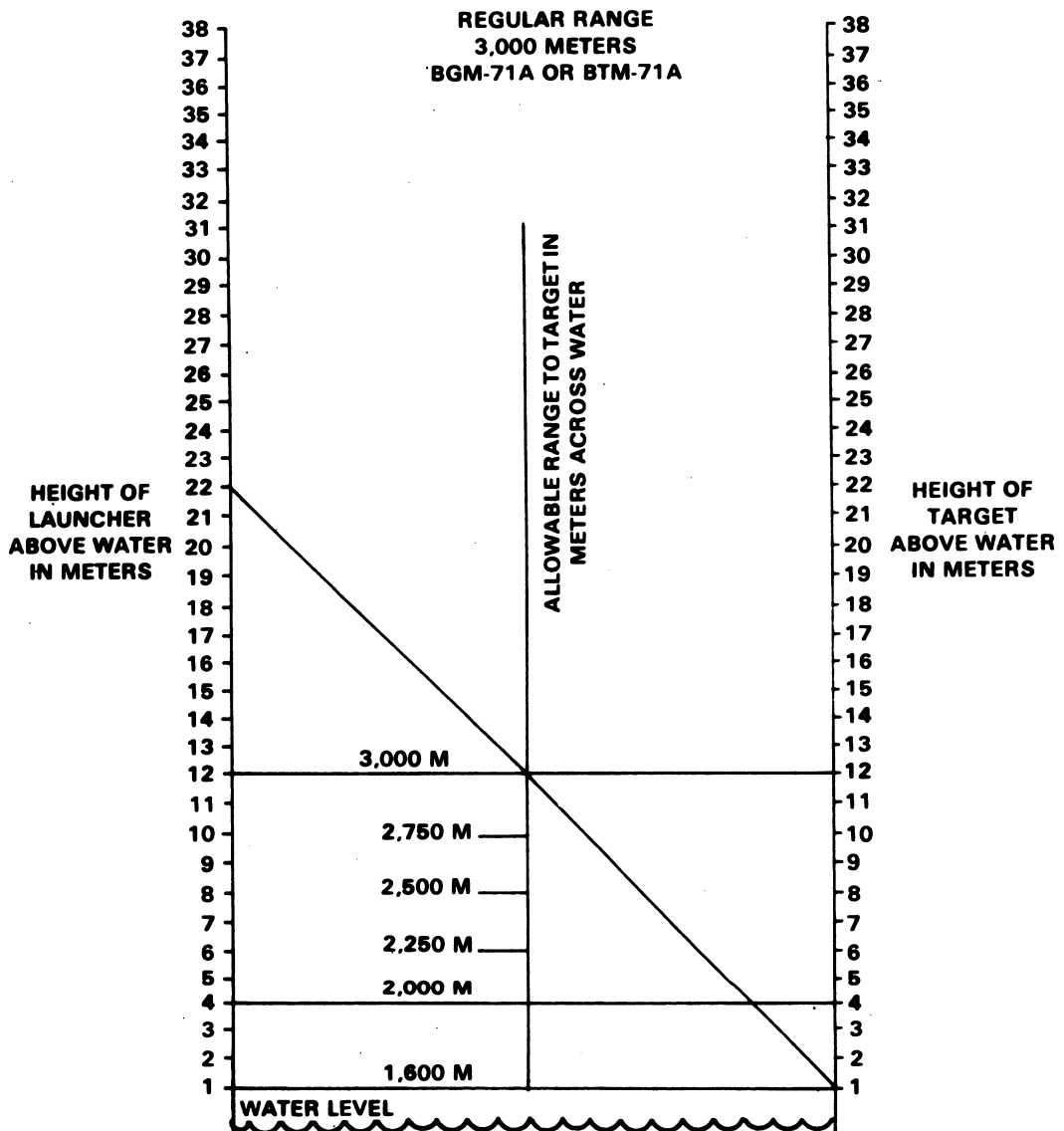


Figure 1. Regular-range chart.

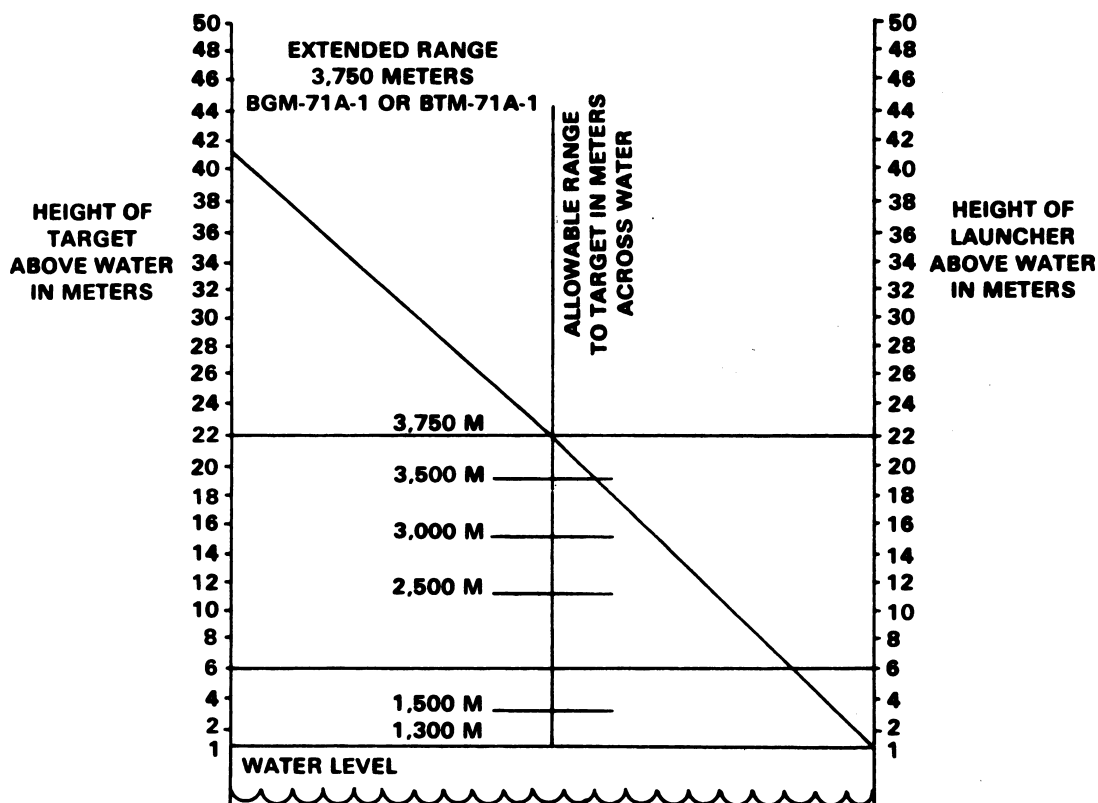


Figure 2. Extended-range chart.

STEP A.	DISTANCE FROM LAUNCHER TO LAKE	500 meters
STEP B.	DISTANCE YOU KNOW THE MISSILE CAN TRAVEL	+1,600 meters
	DISTANCE MISSILE CAN TRAVEL AT WATER LEVEL	<u>2,100 meters</u>
STEP C.	HEIGHT OF LAUNCHER ABOVE WATER	5 meters
STEP D.	HEIGHT OF TARGET ABOVE WATER	+ 6 meters
		<u>11 meters</u>
STEP E.	60-METER INCREASE IN DISTANCE FOR EVERY 1 METER	x 60 meters
	HEIGHT ABOVE WATER	<u>660 meters</u>
STEP F.	DISTANCE AT WATER LEVEL MISSILE CAN TRAVEL	2,100 meters
	INCREASED DISTANCE DUE TO HEIGHT OF LAUNCHER	+ 660 meters
	AND TARGET ABOVE WATER	
	MAXIMUM ENGAGEMENT RANGE	<u>2,760 meters</u>

NOTE: To increase your maximum engagement range, raise the launcher's height 1 meter for each 60-meter increase in range required.

2. Firing From Tow Carriers. Insure that the backblast area is clear and that the backblast is not directed into the vehicle. Also insure that there is adequate muzzle clearance between the launcher and the vehicle.

3. Firing Over Electrical Wires. If the command-link wires contact a live high-voltage powerline, you can be injured or lose control of the missile. The launcher electronics may also be damaged.

4. Firing In Windy Conditions. Gusty, flanking, or quartering winds can cause the launch tube to vibrate and spoil your tracking performance. The effect is similar to what you experience while driving in a strong crosswind. Position the TOW behind a windbreak to reduce this problem. Strong winds can move the missile around during flight, but as long as you can keep the crosshairs on center-mass of the target, the weapon system itself will compensate for wind effects.

5. Firing Through Smoke And Area Fires. Smoke can obscure your line of sight and hide the target. You should maintain a smooth tracking rate as the target disappears into the smoke cloud so that you will still be on target or very close as the vehicle goes out the other side of the smoke cloud. (This technique should be practiced during field tracking exercises.) A fire can burn through the command-link wire, causing you to lose control of the missile. Avoid firing through fire and over fires if there is the possibility that the wires will contact the fire before missile impact.

6. Firing From Bunkers And Buildings. TOWs can be fired from enclosures if the following requirements are met:

a. Size of the room. The size of the room should be 7 x 24 feet with a 7-foot ceiling. Smaller rooms may be used if there is adequate ventilation for backblast.

b. Ventilation. There must be at least 20 square feet of ventilation, preferably to the rear of the launcher. Open all windows and doors.

c. Debris. Clear the room of all loose objects that will be affected by backblast. This includes breaking out all glass windows and clearing all rubble from the backblast area. The room should be of sturdy construction. Everyone in the room must be forward of the rear end of the launch container.

d. Noise. All personnel in the room must have double ear protection to prevent hearing loss. Earplugs and combat vehicle communications (CVC) helmets provide such protection.

7. Clearance Requirements (fig. 3).

a. For muzzle clearance, there must be at least 9 inches of clearance at the end of the launch tube. This is so that the wings and control surfaces will not be damaged when they extend after the missile clears the launch tube.

b. The muzzle of the launch tube must extend beyond the enclosure, window sill, or aperture.

c. There must be at least 30 inches of clearance between your line of sight and any obstruction from 500 to 900 meters downrange. This is required because the missile may fly below the gunner's line of sight between 500 and 900 meters. A 30-inch line of sight clearance will insure a very high chance that the missile will not hit the ground on its way to the target.

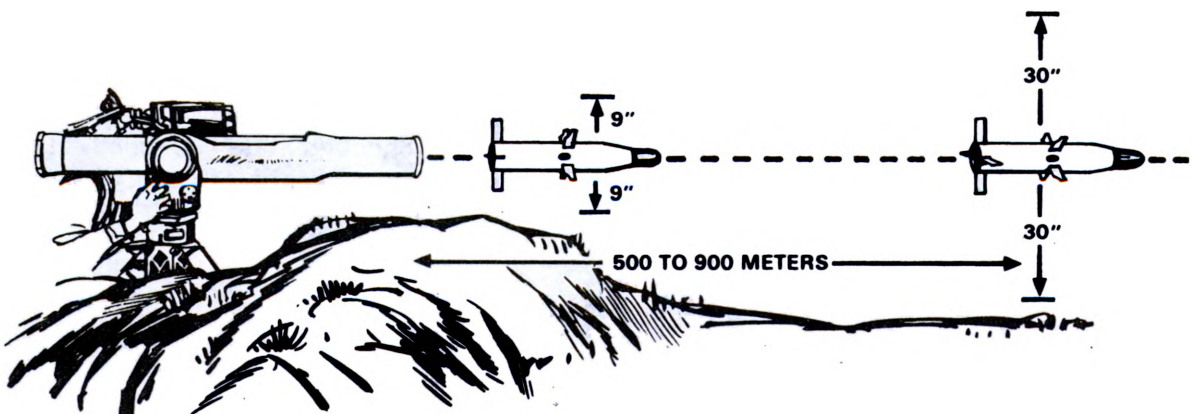


Figure 3. Clearance requirements.

REFERENCE:

None

071-316-2519

ENGAGE A TARGET WITH A TOW

CONDITIONS:

Given a loaded and armed TOW weapon system correctly positioned for firing, a sector of fire, an engageable target entering the sector of fire within TOW range, and proper squad leader fire commands (using command "FIRE").

STANDARDS:

1. Acquire and track the target upon being given the target identification/location.
2. Fire the missile upon being given the command of "FIRE," IAW performance measure 4c.

PERFORMANCE MEASURES:

1. Place your eye well into the rubber eyepiece.
2. Place both hands firmly on the control knobs, as shown in figure 1.

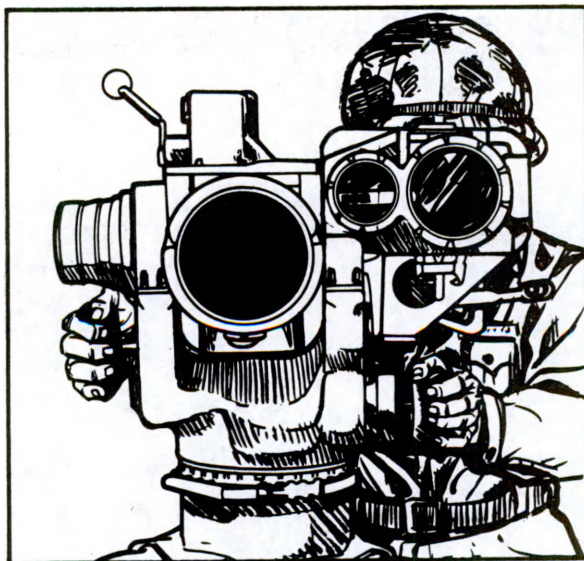


Figure 1

3. Situate your body so there is no contact between the shoulder and the encased missile. Your only contact with the launcher is with the hands and eye. Assume a firing position that is comfortable. An uncomfortable position causes muscle tension that affects your ability to track smoothly.

NOTE: When firing from the ground, you should kneel on one or both knees.

4. ACQUISITION, TRACKING, AND FIRING.

a. Acquisition. Once a target is sighted, acquire it in the optical sight, raise the trigger protective cover, and establish a smooth tracking rate while keeping the crosshairs on center of visible mass of the target (fig. 2).

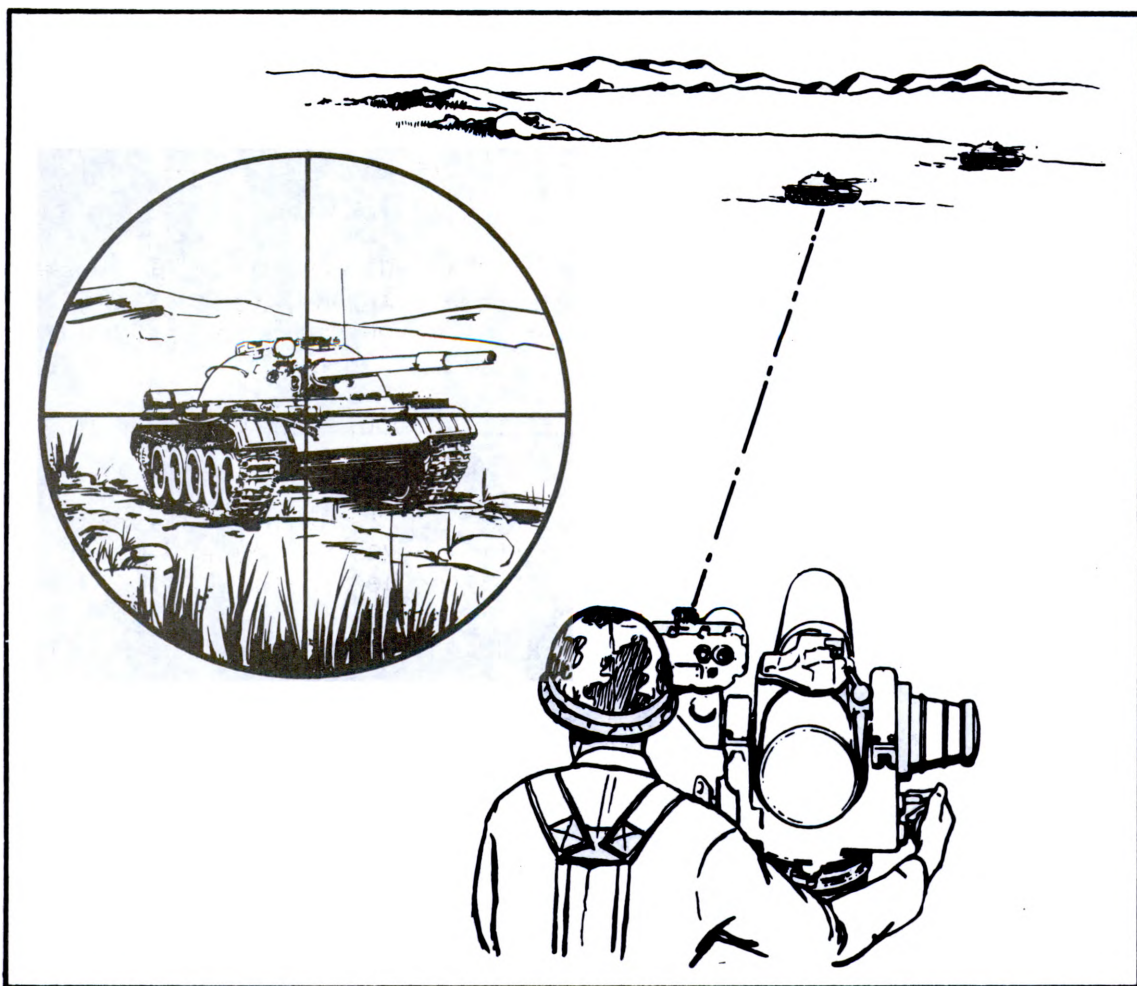


Figure 2

b. Tracking.

(1) To move the launch tube left or right, apply a smooth, steady force to both control knobs by pushing one and pulling on the other and rotating your body from the waist up as the launcher moves.

(2) To elevate or depress the launch tube, apply a smooth, steady twisting force to both control knobs. Applying pressure to only one control knob, or uneven pressure, makes it more difficult to track smoothly.

(3) Maintain the same arm, shoulder, and head position throughout an engagement. Any change in body position other than leaning with the controls will cause a jerking motion. This could result in an erratic maneuver and possible ground impact after the missile is fired.

c. Firing.

(1) Take a deep breath and let part of it out just before pressing the trigger. Proper breath control is particularly important during the first and last 400 meters of missile flight. Improper breathing will cause you to track poorly.

(2) Once the trigger is pressed, there is a 1.5-second delay before the missile is launched. This delayed firing of the launch motor can cause you to flinch or jerk the control knobs if you aren't prepared for it.

(3) There are two noises you should be prepared for once you press the trigger:

- The first noise is a "POP." This is the gyro being activated. It is not loud, but it may cause you to think a misfire has occurred, and you may not be prepared for the next noise.

- The second noise is the launch motor firing. This is a loud noise similar to the LAW firing.

(4) One effect caused by the firing of the launch motor (other than noise) that can be distracting is the backblast. The dust, smoke, heat, and debris from the backblast may cause you to flinch.

(5) When the missile appears in the sight picture (fig. 3), ignore it. Never try to fly the missile. If you are distracted, your tracking becomes poor, and your chances of hitting the target are reduced. Continue to track the target at a smooth tracking rate keeping the crosshairs on the center of visible mass until missile impact.

Whenever the missile appears in your sight picture---IGNORE IT!!

DON'T TRY TO FLY THE MISSILE!

Keep the crosshairs on center of visible mass until missile impact.

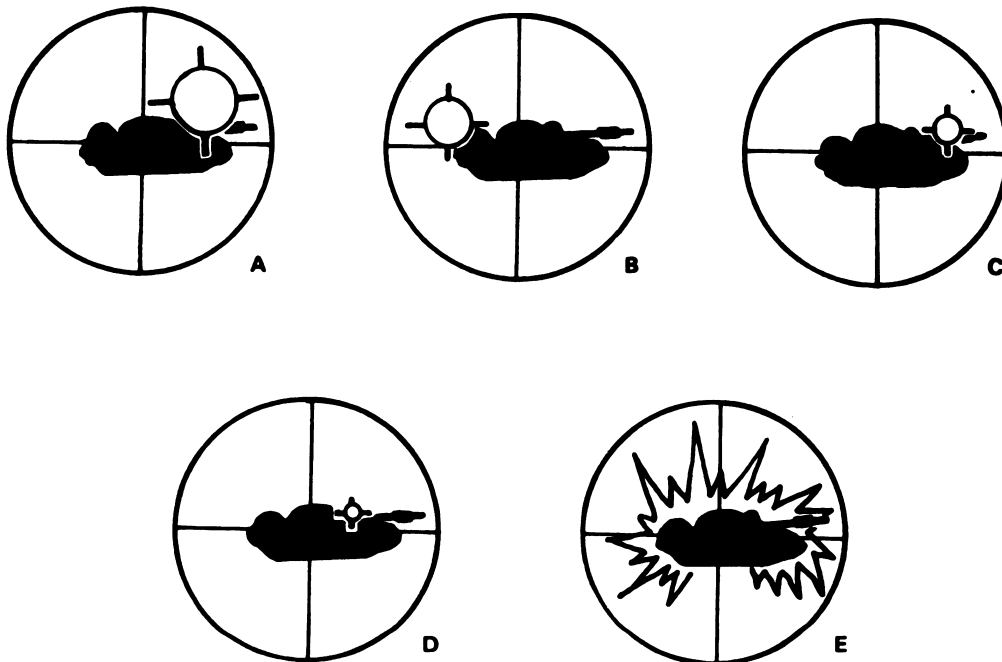


Figure 3

REFERENCE:

TEC Lesson 948-071-0024-F, Loading, Tracking, and Firing the TOW

071-316-2521

PREPARE AN ANTIARMOR RANGE CARD (TOW)

CONDITIONS:

In a field environment, given a TOW weapon system, a fighting position (designated as primary, alternate, or supplementary), a sector of fire, target reference points and probable target engagement areas, pencil and paper, and lensatic compass.

STANDARDS:

Within 10 minutes, prepare a range card for a TOW that illustrates a representative sketch of the terrain and includes as a minimum:

1. The weapon position indicated by the proper weapon symbol (Ⓐ TOW).
2. Distance and azimuth plotted from a known point to the weapon position.
3. Assigned sector of fire showing complete boundaries.
4. Maximum engagement line.
5. Deadspace within the sector of fire.
6. Azimuth and range to target reference points (TRP) and/or anticipated target engagement areas.
7. Magnetic north arrow (properly oriented).
8. Marginal information.
 - a. Firing position designation (primary, alternate, or supplementary).
 - b. Unit designation (no higher than company).
 - c. Date/time group.

PERFORMANCE MEASURES:

1. A range card is a sketch of the terrain that a weapon has been assigned to cover by fire. It contains information which assists in the planning and controlling of fire, in the rapid detection and engagement of targets, and in the orientation of replacement personnel or units. By using a range card, you can quickly and accurately determine the information you need to engage targets.

2. Sector of Fire. A sector of fire is a portion of the battlefield within which you are responsible to engage targets with your weapon. A sector of fire can be of any shape or size. Leaders assign sectors of fire to insure that no matter where a target approaches, there will be a weapon positioned which can engage it. The following terms are used in conjunction with sector of fire.

a. Anticipated Target Engagement Areas. Your leader may also designate anticipated target engagement locations within your sector of fire. These are recognizable terrain features on or near likely enemy avenues of approach.

b. Target Reference Points (TRP). TRPs are natural or manmade terrain features which can be used as reference points for locating targets and controlling direct fires. TRPs are designated by a specific letter or number (or a combination). If there are TRPs in or near your sector of fire, your leader will point them out and tell you the designation. If he does, they are shown on your range card.

c. Deadspace. Deadspace is an area or areas where direct fire weapons cannot hit. The area behind houses, hills, or within orchards, for example, is deadspace. All deadspace in your sector(s) of fire must be determined because your leaders need to plan other types of fire (mortars, artillery, mines, etc.) to cover the area. Deadspace is indicated on your range card by a series of parallel lines, or the word "DEADSPACE."

d. Maximum Engagement Line. The maximum engagement line is a line beyond which a target cannot be engaged. This line may be closer than the maximum engagement range of the weapon. Both the terrain and the maximum engagement range of your weapon will determine the path of the maximum engagement line.

3. After your leader shows you where to position your TOW, he will indicate your sector of fire by pointing out the portion of the terrain for which you are responsible. He will do this by giving you boundaries located between prominent terrain features, or by left and right limits indicated by terrain features or azimuths. If necessary, he may also assign you more than one sector of fire and will designate one as primary and the other as secondary.



EXAMPLE OF A SQUAD LEADER'S BRIEFING

Our mission is to cover a sector of fire that begins here and goes in the direction of the windmill to maximum engagement range; it extends to the right across the high ground behind the houses, and hill, to the right edge of the orchard and returns here. The enemy should approach from north and will probably use both Mace Road and Tepe Road to enter our sector. We must plan on engaging the enemy in this area as soon as he is within range. There is one target reference point within our sector. It's the junction of Toad and Mace Roads. That's it there, in front of that group of houses. Label the road junction TRP 6. We'll use the road junction to our left rear as the reference point to locate our position.

NOTE: The instruction on range card preparation contained in this task is based on this example.

4. Preparation of the range card is based on the following considerations and procedures.

a. Once your leader has given you the necessary information, (see example), you can begin preparing your range card, depending upon the priority of other jobs you must perform, such as preparing and camouflaging your firing position. If you are assigned alternate and supplementary firing positions, a range card is required for them also.

b. Procedure:

(1) In the lower center of your range card, indicate your firing position by drawing the symbol of your TOW. Then draw and label your sector sketch. Draw roads, bridges, buildings, streams, hills, woods, etc. Be as accurate as you can (fig. 1).

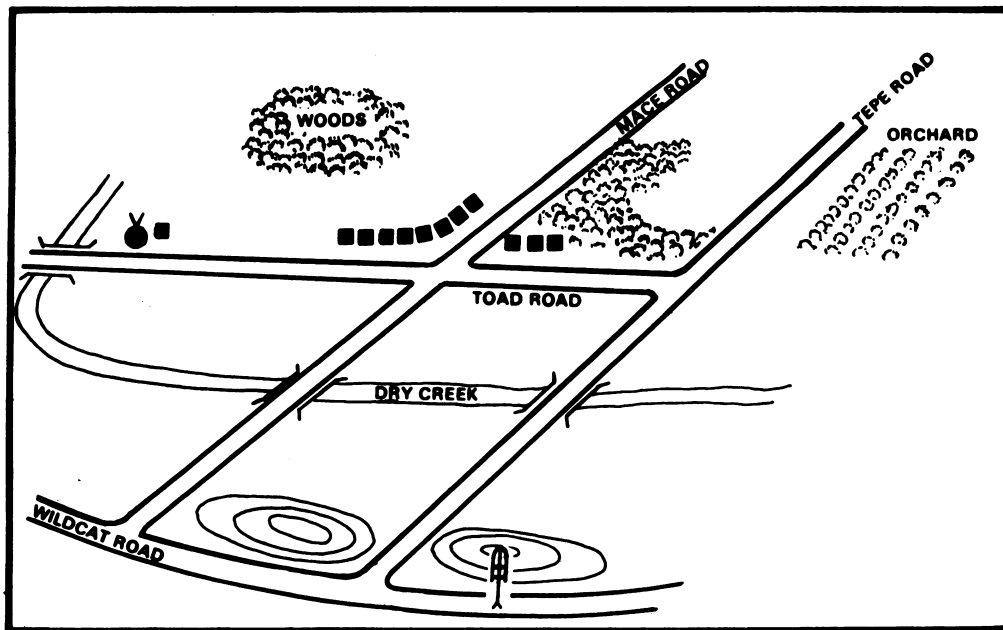


Figure 1

(2) Show the location of your firing position by drawing an arrow from a nearby recognizable terrain feature to the weapon symbol. Label the recognizable terrain feature and add the distance and azimuth from the terrain feature to your firing position (fig. 2).

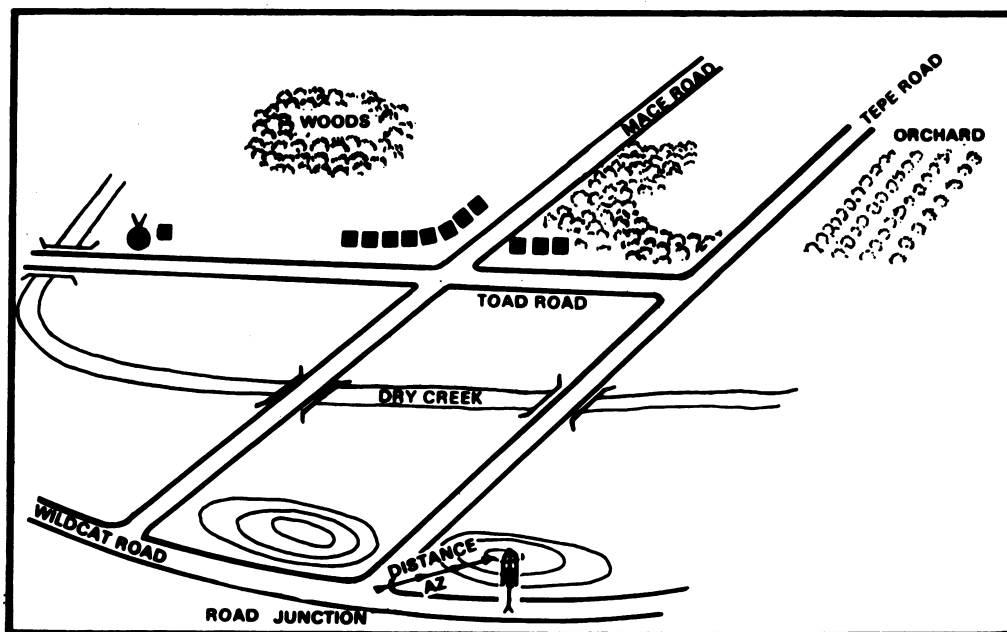


Figure 2

(3) Now draw in your sector. This is an enclosed line that outlines your sector of fire. The maximum engagement line is a segment of the sector line and indicates the maximum range that targets may be engaged (fig. 3).

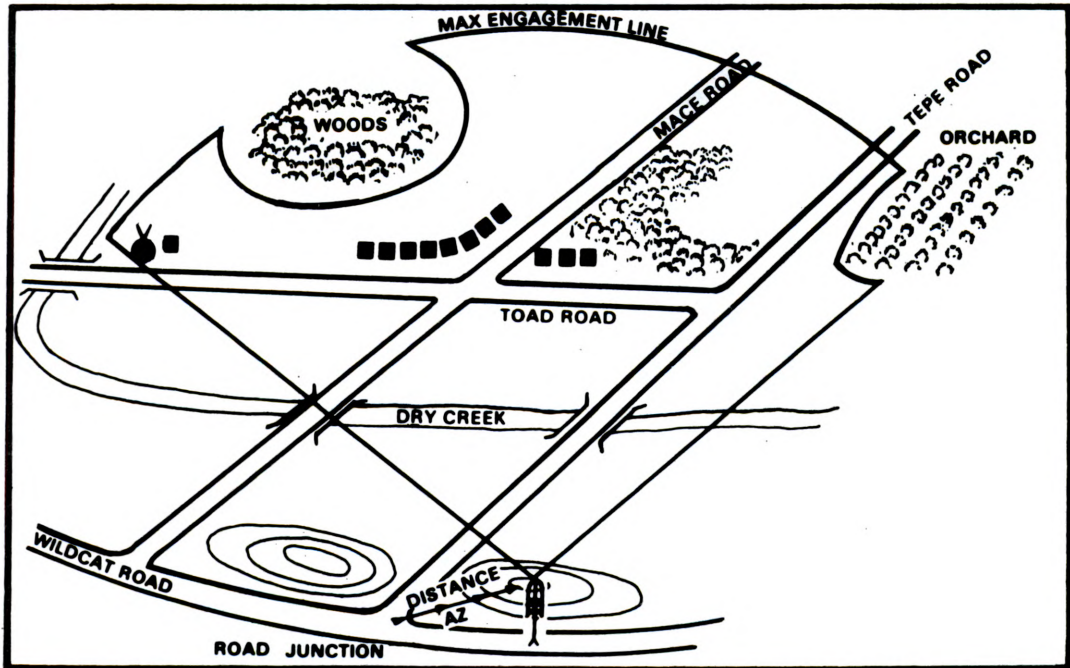


Figure 3

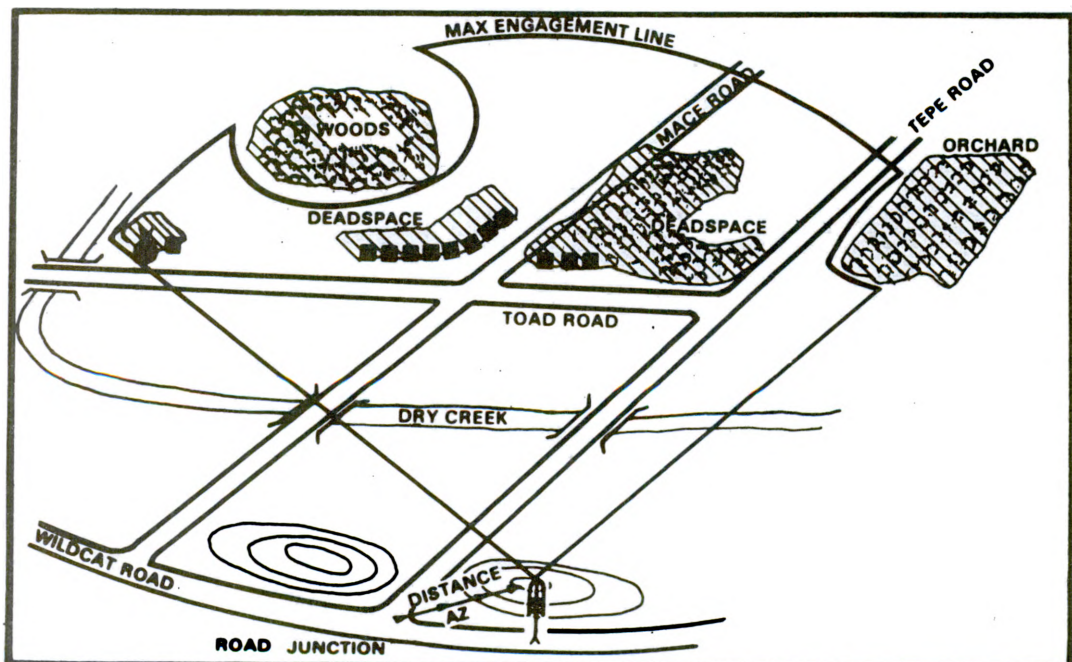


Figure 4

(4) Draw in the deadspace in your sector. Be sure and indicate by an enclosed line, containing parallel lines, those areas you cannot hit. You can also write the word "DEADSPACE" (fig. 4).

(5) Orient the range card with the terrain and determine the direction of magnetic north with a compass. Draw a magnetic north arrow properly oriented. Draw the TRPs in your sector and label them. Then draw in the range and azimuth to the TRPs. If any anticipated target engagement locations are given, draw in the range and azimuth to them (fig. 5).

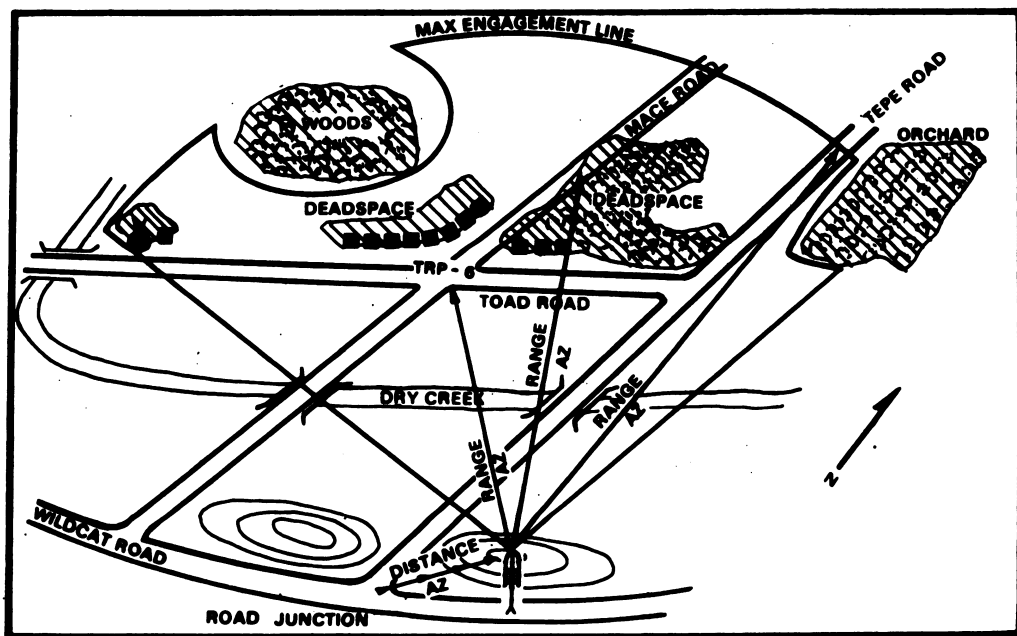


Figure 5

(6) In a corner of your range card, place the following marginal data which is used by leaders to identify range cards (fig. 6).

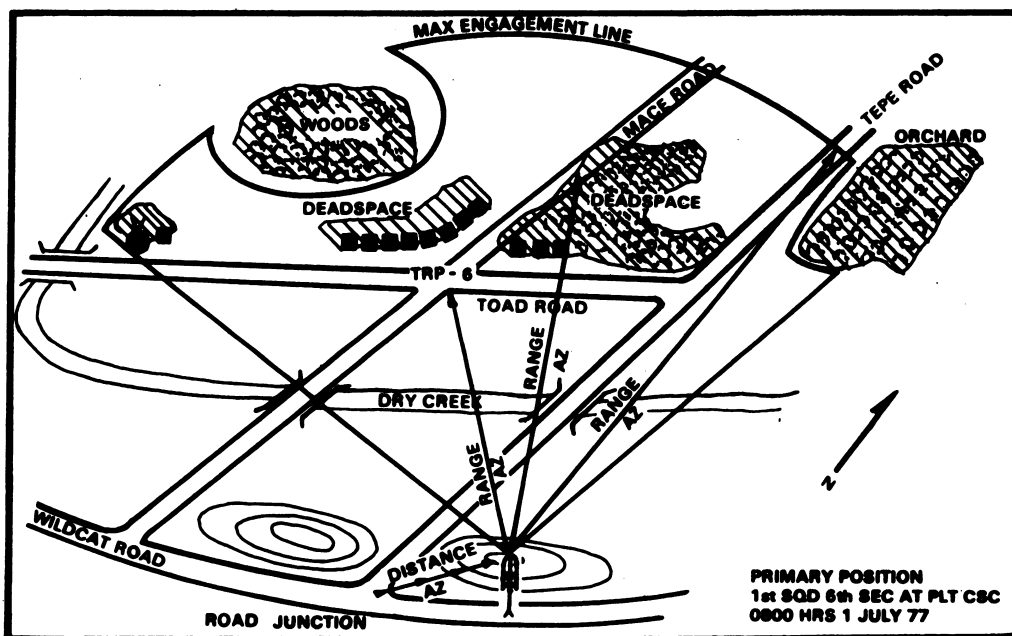


Figure 6

(a) Type position (primary, alternate, supplementary).

(b) Unit description--Never indicate your unit higher than your company. The enemy will not be able to learn important military information if they find your range card.

(c) Date/time group (the actual time you completed the range card).

(7) Your range card is now finished. The range card you construct for your sector of fire will not look the same as the one in this task. However, the basic information and method of construction presented in this task is the same when preparing a TOW range card.

(8) Make two copies of each range card prepared. Keep one copy at your firing position. The second copy will normally be picked up by your squad or section leader for preparation of fire plans and coordination of fires.

REFERENCE:

TEC Lesson 948-071-0029-F, Preparation of TOW and Dragon Range Cards

071-316-2550

OCCUPY A TOW FIRING POSITION

CONDITIONS:

As a squad leader, given a squad sector of fire, the general location of a firing position, and a vehicle-mounted TOW weapon system.

STANDARDS:

The position occupied must, as a minimum:

1. Cover sector of fire.
2. Use natural cover and concealment.
3. Avoid conspicuous terrain features.

PERFORMANCE MEASURES:

1. Approach the general location of a firing position from the rear or flank. Stop the vehicle short of the location in a covered and concealed position, dismount, and reconnoiter the general location for the exact firing position.

a. Always attempt to find a mounted firing position. This increases the flexibility of the squad by using the minimum amount of time in displacing to new positions.

b. It may be necessary to dismount the TOW and carry it to the firing position if the terrain prevents the vehicle from moving to the position or if the vehicle cannot be concealed.

2. An ideal TOW position would be one that allows for a flank engagement, offers concealment of the flash and weapon signature, has the weapon defiladed from the direction of approaching OPFOR vehicles, and offers concealment to the front. You should strive for a flank engagement (especially at ranges of 1,500-2,000 meters where OPFOR tank guns have a better than 50/50 chance of a first-round hit).

a. An advancing tank's firepower and observation are generally oriented to the front, making it difficult to detect and retrace a TOW launched from its flank.

b. Armorplating on the sides of an OPFOR tank is thinner, which will help insure a kill. You should strive to find a position that will conceal the flash and signature because a tank trailing the one fired on may sight your launch signature and fire on your position.

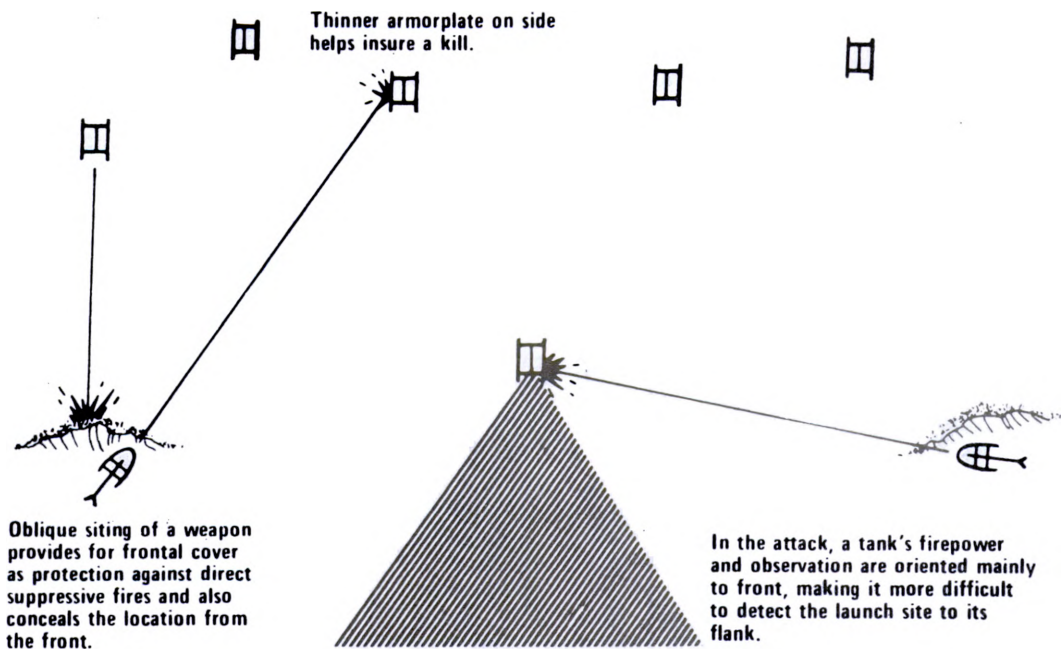


Figure 1. TOW positioning.

3. The position occupied must:

a. Cover the sector of the fire. Covering the squad sector of fire means that you can see and engage targets in it while avoiding detection yourself. The position selected should be one that has the best shot into the assigned sector of fire (preferably a flank shot). If you have been assigned a sector of fire where there is no position available to see and engage targets, notify your section sergeant immediately. If you have deadspace in your sector of fire, insure your section sergeant is aware of this so he can arrange the section to best cover the assigned section sector of fire and so he can designate primary and alternate positions.

b. Use natural cover and concealment.

(1) Virtually every piece of terrain has features that can enhance or degrade mission accomplishment with the TOW. Some terrain features that will serve to maximize the chances for success of the TOW and minimize its vulnerability due to detection are:

(a) The military crest of hills (not near good reference points).

(b) The reverse slope of hills to fire at the rear or flank of OPFOR vehicles.

(c) The edge of a woodline.

(2) Use the terrain to your advantage for cover from enemy fire and for concealment from enemy ground and aerial observation. Since perfect cover and concealment will not always be available, priorities must be established. The terrain characteristics you must look for in picking a position are (in the order of their desirability):

(a) Cover and concealment.

(b) Cover.

(c) Concealment.

NOTE: Concealment of the flash and signature is an overall essential factor.

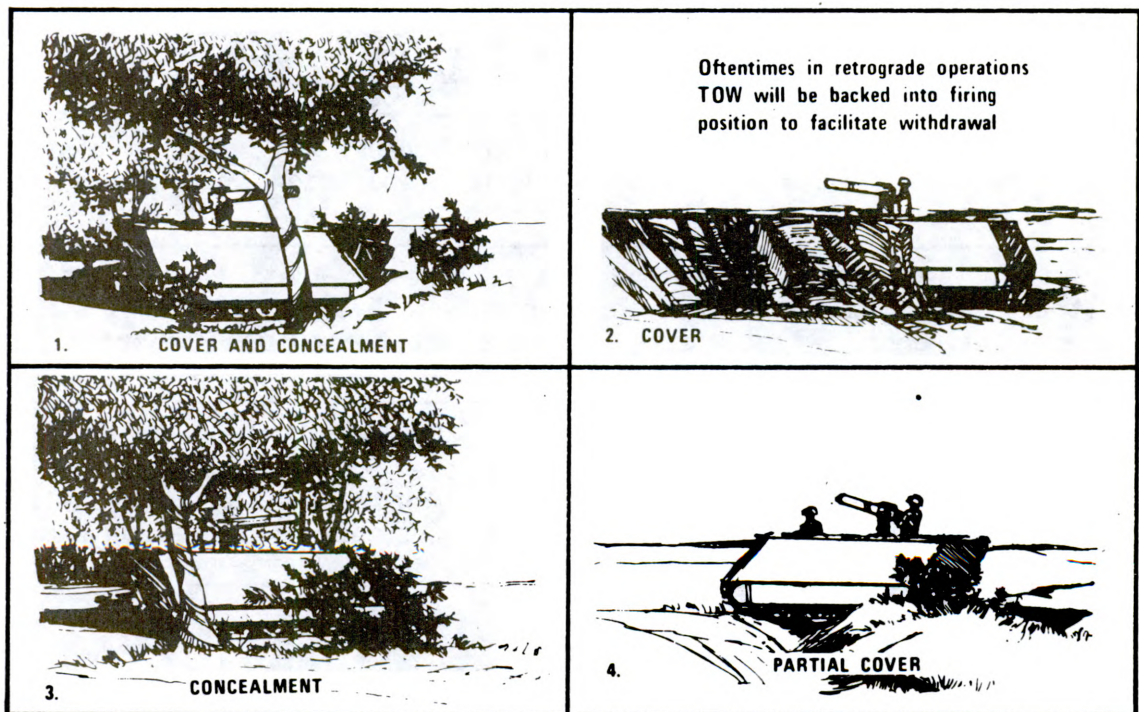


Figure 2. TOW positions using cover and concealment.

(3) When analyzing the terrain in your sector, consider the proper use of high ground. This can gain your crew protection and optimize TOW standoff. In figure 3, the TOW has been positioned far enough back on the high ground so it can cover its sector of fire, yet be protected from tank fire closer than 1,500 meters because of deadspace.

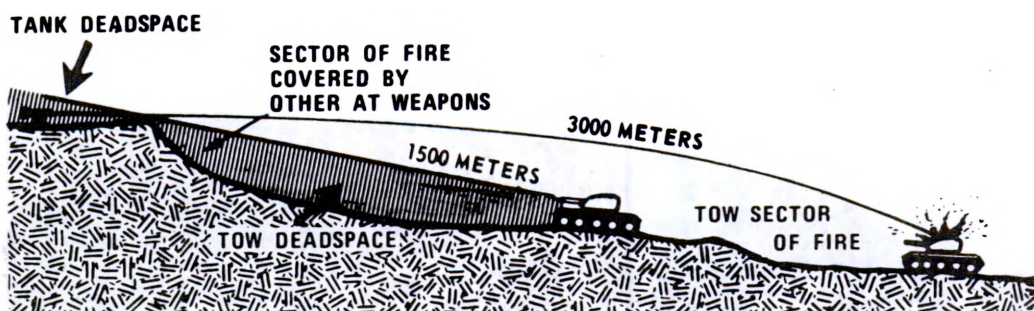


Figure 3. Use of high ground.

(4) At times, you may have to use shadows for concealment (fig. 4). When this happens, vehicles must be moved as the shadows shift. If a vehicle is located under a tree, and the shadows and foliage do not give enough concealment from the air, the vehicle should be camouflaged with branches.

NOTE: The range card must reflect the change in vehicle position because of the shift of the vehicle position when the shadows move.

c. Avoid conspicuous terrain features. Avoid road junctions, hilltops, lone buildings or trees, or other obvious positions. These attract the enemy's attention, and his artillery will probably have registered on them.

NOTE: You must have communication with the section leader or whoever is controlling your fire. Therefore, the position must allow for radio communication, wire communication, or visual communication. Preferably, the position will allow for a combination of these so one can be used as a backup.

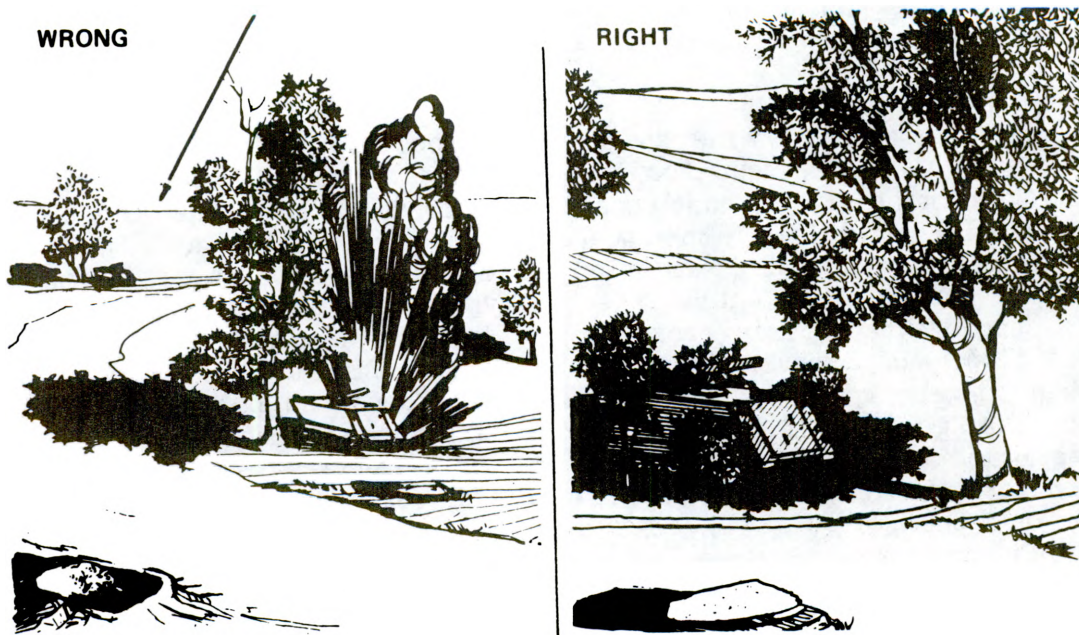


Figure 4. Use of shadows.

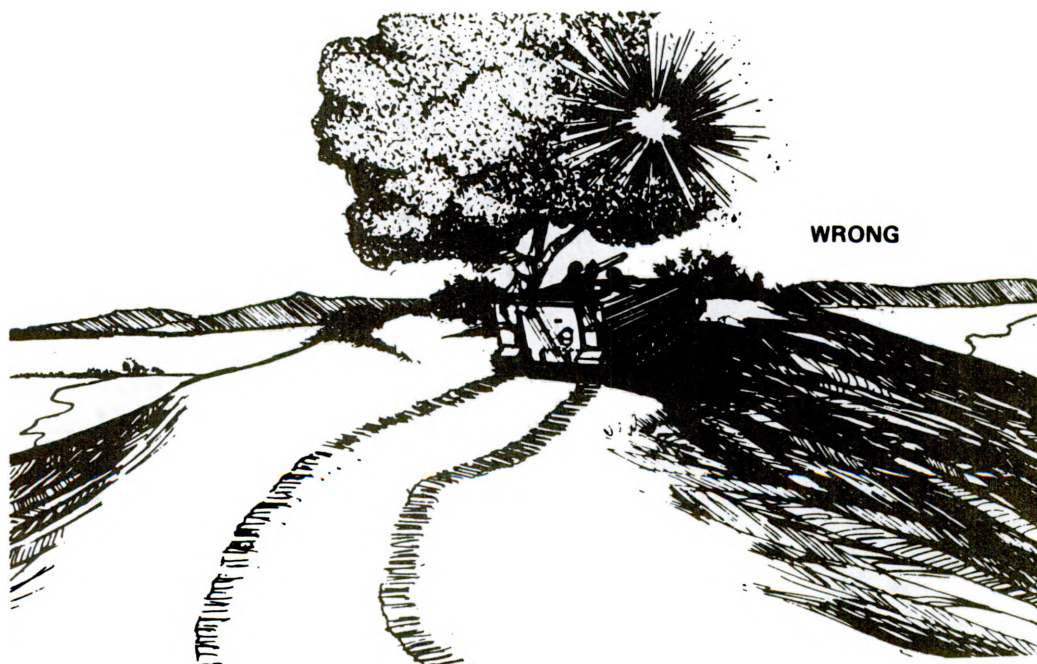


Figure 5. Incorrect TOW positioning.

4. Once you determine the exact location of the firing position, select a concealed route to it and call the vehicle forward and guide it into position.

5. If you determine there is no position within your sector that has natural concealment from enemy ground or aerial observation, and/or you determine it is not practical to camouflage the position with artificial materials, the weapon should be positioned in a nearby covered and concealed location; i.e., a hide position. The weapon should remain there until it actually engages targets from its primary or supplementary firing positions. When the weapon is located in a hide position, an observer from the squad remains at the firing position; when targets appear, he calls the TOW forward and points out the target to the gunner. The observer must have binoculars, as well as communication with the crew. If the observer does not have visual contact with the crew, then a field telephone should be installed between them.

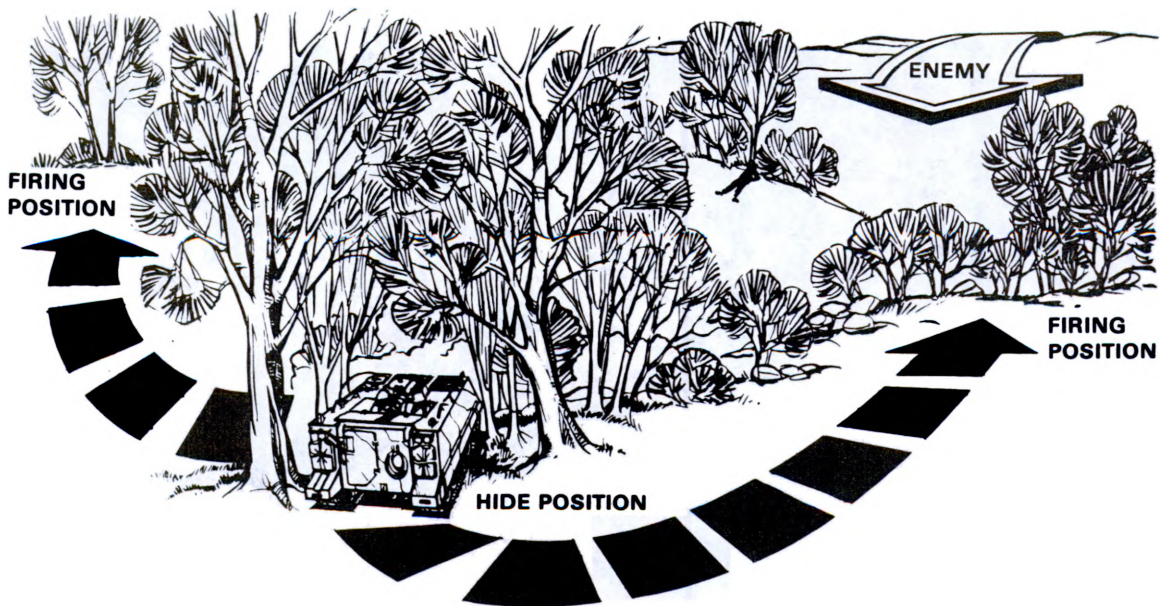


Figure 6. The hide position.

REFERENCE:

None

071-316-2552

CONTROL TOW SQUAD FIRES

CONDITIONS:

Given a TOW weapon system with crew and a sector of fire, prepare to engage targets moving into your sector.

STANDARDS:

1. Explain methods of fire control to your squad so, as a minimum, they will understand:

- a. Engagement priorities.
- b. Sectors of fire.
- c. Target reference points (TRPs).
- d. Phase lines.
- e. Fire patterns.
- f. Fire commands.

2. Given fire commands so that the crew knows what targets are to be engaged. Fire commands will include:

- a. Alert.
- b. Target identification/target location.
- c. Method of engagement.
- d. Execution.
- e. Closing.

PERFORMANCE MEASURES:

1. Responsibilities. Upon receipt of mission:

a. Coordinate for mutual support with any adjacent antitank weapons and integrate the security of the crew with any nearby units.

- b. Supervise preparation of fighting positions.
- c. Supervise the preparation of range cards.
- d. Brief crewmembers on fire control measures.

2. Fire control methods.

a. Fire control measures are normally established by the platoon leader or company commander and are designed to take advantage of the TOW's range, accuracy, and destructive power by equally distributing TOW fires across the battle area. Effective fire control and distribution measures will:

- (1) Prevent firing more than one missile at the same target.
- (2) Avoid needlessly revealing TOW locations.
- (3) Insure complete coverage of all armor avenues of approach.
- (4) Enable TOWs to fire first.
- (5) Provide for destruction of most important targets first.
- (6) Gain the best shot at a target.
- (7) Afford the leader the ability to better control TOW fires.

b. The fire control measures are:

(1) Priority of engagement. Under certain circumstances, a priority of engagement by type of vehicle may be assigned. For example, if enemy air defense weapons are preventing the Air Force or attack helicopters from operating in the forward battle area, destruction of enemy air defense weapons may be given a priority; if enemy carrier-mounted ATGMs are reducing effective employment of tanks, they may be designated as priority targets. When a target is assigned an engagement priority, that target is engaged first when it appears. Other targets are engaged after the priority target has been destroyed. Priority of engagement can be used as a fail-safe measure if radio communication is lost or jammed. Engagement priorities can prevent multiple engagements of one target when:

- (a) Sectors of fire have not been assigned.

(b) Overlapping sectors of fire have been assigned.

(c) More than one section is covering a main avenue of approach.

In the absence of assigned engagement priorities, you should establish priorities to destroy those targets that:

- are the greatest threat to accomplishment of your mission first.

- will break up the momentum of the attack by destroying the command and control element.

(2) Sectors of fire. A sector of fire is the area you will be assigned to cover with your TOW squad. Sectors are assigned to insure that fires are adequately distributed throughout the battle area, to insure that all armor avenues of approach are covered, and to facilitate the massing of fires. They are normally designated by natural terrain features, whenever possible, for ease of identification. Frequently, sectors of fire are shown as being fan-shaped areas; however, a sector of fire may be any shape (fig. 1).

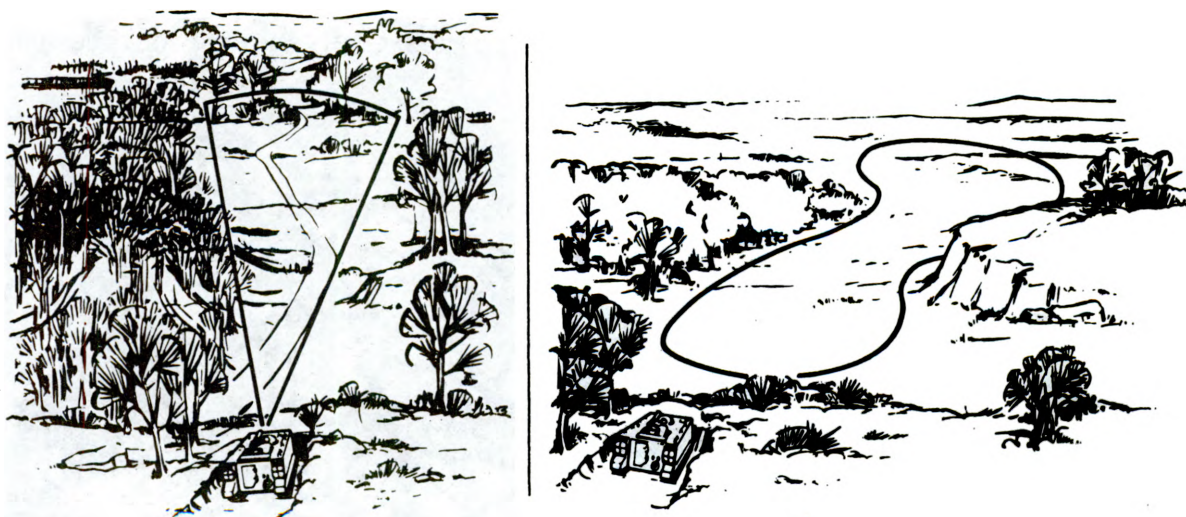


Figure 1

(a) When a TOW squad is assigned a primary sector of fire, it is also assigned a secondary sector of fire. When the terrain permits, the primary sector of one squad is the secondary sector of another squad. This provides for mutual support between squads and permits massing of fires in either sector (fig. 2).

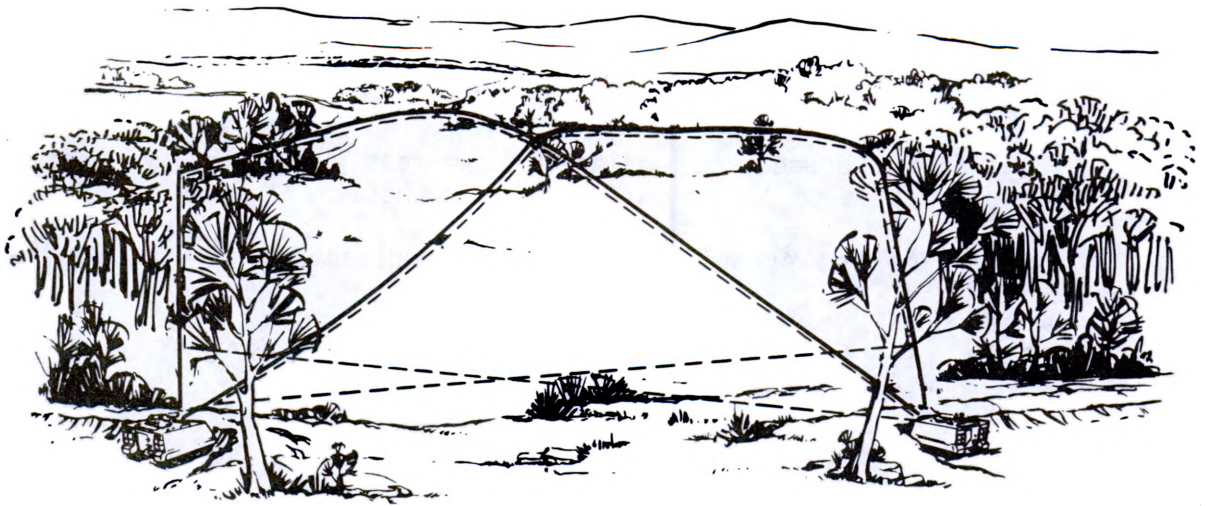


Figure 2

(b) Occasionally, a TOW squad will be assigned a sector of fire that overlaps another squad's sector. This is done to concentrate TOW fires in a critical area or to gain a flanking shot. The leader or commander will coordinate the two squads' fires or designate the leader in the most favorable position as responsible for fire coordination in the sector (fig. 3).



Figure 3

(c) If your squad is assigned a sector that it cannot cover, you must report this immediately to your leader or commander.

3. Target reference points. A TRP is a prominent natural or manmade feature, such as a road intersection, hill, or bridge, designated by the commander to rapidly designate targets and control direct fires. TRPs are normally designated by a letter or number (or a combination) and are recorded on range cards for easy reference (fig. 4).

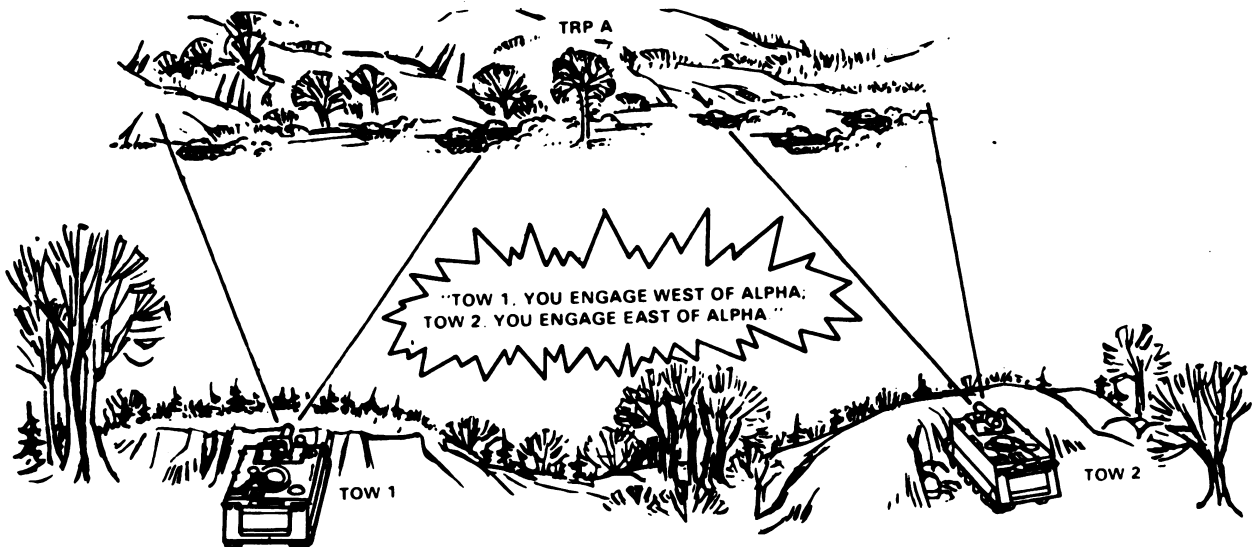


Figure 4

NOTE: Direction from TRPs is given in cardinal directions (north, south, etc.) rather than left or right. However, when you (squad leader) are giving fire commands to your squad and are in the same location as the squad, you can use left or right for ease of understanding and rapid target engagement.

4. Fire patterns. Fire patterns are used to control section fires against an armored formation. Three basic fire patterns will cover most situations and provide fast, effective fire distribution when multiple targets appear. The basic idea is to have each TOW squad start at opposite ends of a formation and work toward the center to prevent multiple engagements of one target.

a. Frontal Fire Pattern. The frontal fire pattern is best used when a target formation is spread perpendicular to your direction of fire and moving across your front (fig. 5).



Figure 5

b. Crossfire Pattern. The crossfire pattern is best used when a target formation is spread perpendicular to your direction of fire and moving toward your position. In addition to distributing section fires, it also enables you to achieve a flank engagement and deceive the enemy (fig. 6).

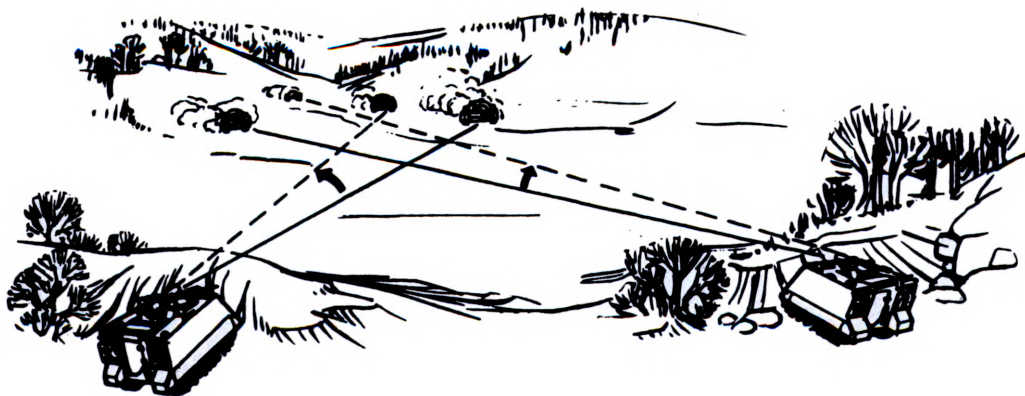


Figure 6

c. Depth Fire Pattern. The depth fire pattern is best used when targets are exposed in depth. One TOW squad engages the far targets; both squads then fire toward the center of the formation. Determination of which squad fires at what target will be made by the leader responsible for controlling the fires (fig. 7).

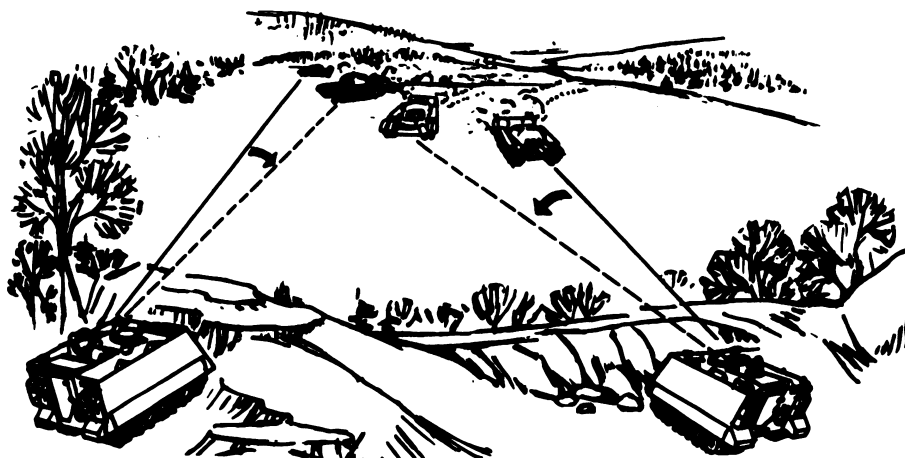


Figure 7

5. Fire commands. The use of a standard fire command insures that the correct target will be engaged as rapidly as possible. It also minimizes radio transmission time. Fire commands should be as short as possible. The fire elements of the standard fire command format should be used.

ALERT

Warns the squad of a fire mission.

**TARGET IDENTIFICATION/
TARGET LOCATION**

A brief description of the target. Squad leader tells the gunner where to look for the target by giving:

(1) direction and distance from the TOW.

(2) direction and distance from a terrain feature or TRP. (Squad leader uses cardinal directions in squad fire commands.)

METHOD OF ENGAGEMENT

Used only when the gunner is faced with multiple targets; i.e., frontal, depth, or crossfire.

EXECUTION

The command "FIRE" or "AT MY COMMAND, FIRE." The first indicates that the gunner is to engage the target as soon as he acquires and begins to track it.

The second command is given in two parts and allows the leader to determine the moment of firing. This allows the leader to maintain the element of surprise and allows for the massing of TOW fires.

CLOSING

"CEASE TRACKING" or "CEASE TRACKING, OUT OF ACTION" will be issued after observing the warhead detonate or when the squad leader desires to halt firing for any reason.

"CEASE TRACKING" notifies the crew that the squad leader intends to remain in position and engage another target immediately or when one appears.

"CEASE TRACKING, OUT OF ACTION" notifies the crew that the squad leader intends to move to another position.

When the section leader is calling a fire mission to your squad over wire or radio, the establishment of communications is a sufficient alert.

REFERENCE:

TEC Lesson 948-071-0023-F, TOW Fire Commands

071-316-2555

REACT TO DIRECT FIRE WHILE MOUNTED
(TOW/ITV)

CONDITIONS:

As squad leader of a TOW squad (M113A1, M901, M151, M274 units) conducting a mounted movement, given direct fire from an enemy position(s).

STANDARDS:

Return fire immediately, direct the driver to move to the nearest covered position, report the contact to your section leader, and follow his instructions.

PERFORMANCE MEASURES:

1. The following actions are shown in order of priority, but they should be accomplished simultaneously upon contact. This response can be developed through the development of teamwork within your squad. With proper training, the squad will respond as a unit; i.e., return fire with the vehicle-mounted machinegun or individual weapons while the driver seeks and occupies a covered position without your guidance. This teamwork will permit you to report immediately and initiate subsequent action quickly. In some instances, this teamwork will give you the flexibility to react independently and avoid costly delays.

2. The most critical action taken upon receiving direct fire is to return fire with all available weapons. The vehicle-mounted machinegun plays the primary role in this effort to suppress the enemy's fire, but the added firepower of any weapons being employed must not be overlooked. If there is no vehicle-mounted machinegun, all available squad members should return fire. This massive response is crucial in order to allow subsequent actions.



A moving TOW squad comes under direct Sagger fire. It immediately returns fire with the .50 cal machinegun and seeks cover to engage target with the TOW.

Figure 1

3. As suppressive fire is initiated, you must concern yourself with locating a covered position. If you have taken advantage of the terrain during the movement, the difficulty of this task will be minimized.

4. Upon receiving any fire, you should contact the section leader and advise him of the situation. Once this is done, he can develop the situation or provide you with the support you will need if you are pinned down or in contact with a force you cannot handle alone.

REFERENCE:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (chap 4, pages 4-21, 4-22)

071-316-2601

PLAN AND CONTROL TOW SECTION FIRES

CONDITIONS:

Situation 1: As a TOW section leader, given two vehicle-mounted TOW systems with complete crews and a mission to cover a specific sector of fire (armor kill zone).

Situation 2: Targets move into your sector of fire.

STANDARDS:

Situation 1: The section leader will establish means of fire control to include:

- a. Coordination for mutual antiarmor weapon support.
- b. Informing squad leaders of:
 - (1) Engagement priorities.
 - (2) Sectors of fire.
 - (3) Target reference points (TRPs).
 - (4) Phase lines.
 - (5) Fire patterns.

Situation 2: The section leader will give fire commands so the squad leader knows what targets are to be engaged.

PERFORMANCE MEASURES:

1. Fire Control. See task: Control TOW Squad Fires.
2. Coordination of Fire. The section leader coordinates fire within his sector(s) by the use of range cards which consist of control measures, the location of all firing positions for the TOWs in his section, and the targets they can cover from each position. This is a three-step process.

STEP 1: The AT platoon leader, company commander, or the weapons platoon leader gives initial directions to the TOW section leader. The directions include:

Primary sector of fire. The sector of fire that is covered from the primary and alternate firing positions.

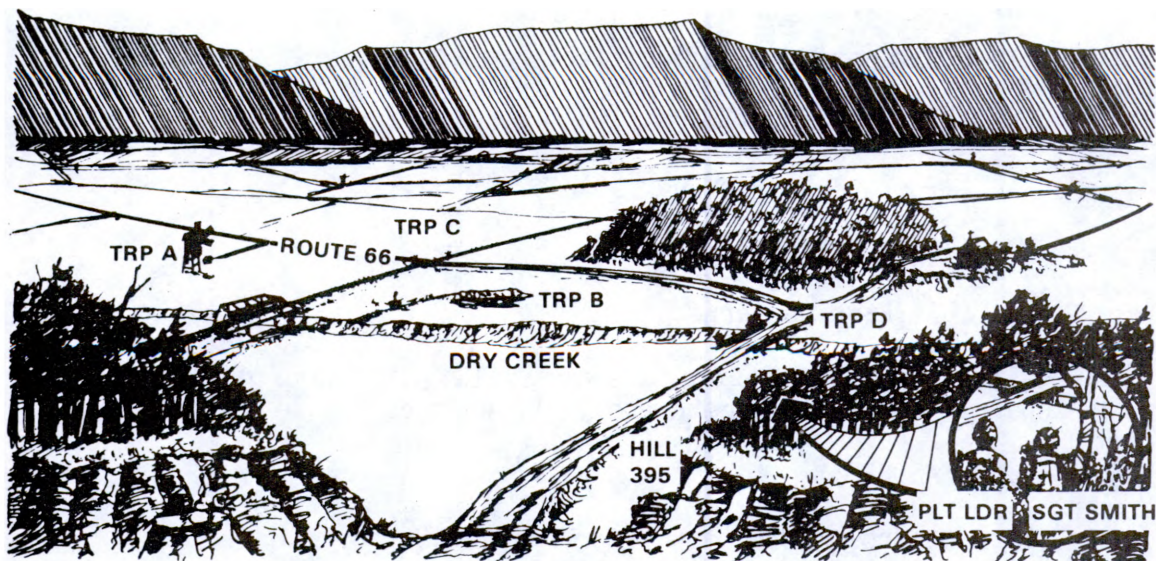
Secondary sector of fire. The sector of fire that the section is prepared to cover, on order, from the primary or an alternate firing position.

Target reference point. Easily recognizable terrain features which are used to control the massing and shifting of fire.

General location of firing positions. Positions that can cover the sector(s) of fire, while optimizing the capabilities of and providing protection for the crew.

NOTE: If the section leader determines he cannot cover the assigned sector (because of terrain limitations, etc.), he must report this immediately to the man who assigned him the sector.

AN EXAMPLE: AT PLT LDR GIVING MISSION TO SECTION LDR



"Sgt Smith, your sector of fire is west of Farmers Highway between Dry Creek and Route 66. Select firing positions in the vicinity of 3d Platoon on Hill 395. Be prepared to fire in Sgt Brown's sector of fire which is east of Farmers Highway and north of Dry Creek, or into Sgt Jones' sector of fire, which is north of Route 66, east of the RR, and west of the cemetery. Mark the target reference points; the windmill is A; the water hole is B; the RT 66 RR intersection is C; RT 66 bridge is D. We are in general support so take your fire commands from me."

STEP 2: The TOW section leader and squad leader pick exact firing positions (primary and several alternates) to cover the assigned sectors of fire and point out the TRPs to the crew. If required, the section leader may select additional TRPs in the primary sector of fire.

STEP 3: Each squad leader has a range card prepared for his sector of responsibility. These range cards are forwarded to the TOW section sergeant who reviews the range card to insure that his sector is covered. He then forwards the range cards to the platoon leader. The range cards give the location of each TOW firing position and the coverage of TRPs. Range cards are used by the platoon leader to prepare a platoon fire plan.

3. Supervise Preparation of Range Cards. (See task: Prepare an Antiarmor Range Card (TOW).) Range cards are always prepared for the primary firing position and for as many supplementary positions as time will permit. They are used as a ready reference by the TOW gunner for quick and accurate fire.

REFERENCE:

None

FM 31-11C-S

071-316-2602

SUPERVISE COMBAT LOADING OF PERSONNEL
AND EQUIPMENT IN ORGANIC VEHICLE

CONDITIONS:

Given an M901, M113A1, M151A1, M274, a squad-size element, a loading plan (SOP), and equipment authorized to be loaded (per unit SOP).

STANDARDS:

Organize and position personnel and authorized equipment on the vehicle IAW unit loading plan (SOP).

PERFORMANCE MEASURES:

GUIDE FOR COMBAT LOADING.

1. Combat loading is a logical sequence of placing your squad's ammunition and equipment on the outside and inside of the vehicle. Sleeping equipment and other low-use items will be placed in first, and high-use items such as ammunition will be placed in last.

2. An SOP for combat loading is usually established by the company or section. Refer to the existing unit SOP for placement of ammunition and equipment inside the vehicle. All members of the squad should know where each item is placed.

3. A listing and diagram for placement of basic issue items for the--

- a. M151 can be found in TM 9-2320-218-10.
- b. M274 can be found in TM 9-2320-246-10.
- c. M901 can be found in TM 9-2320-259-10.
- d. M113A1 can be found in TM 9-2300-257-10.

REFERENCES:

TM 9-2300-257-10, Operator's Manual: Carrier, Personnel: Full Tracked, Armored, M113A1, Aug 78 (app E, pages E-1 thru E-4)
TM 9-2320-218-10, Operator's Manual for Truck, Utility: 1/4-Ton, 4X4, M151, M151A1, M151A2, Aug 78 (app B, pages B-1 thru B-10)
TM 9-2320-246-10, Operator's Manual: Truck, Platform, Utility, 1/2-Ton, 4X4, M274, Apr 67 (app B, pages B-1 thru B-5)

071-316-2603

SUPERVISE CONSTRUCTION AND CAMOUFLAGE
OF A TOW FIGHTING POSITION

CONDITIONS:

In day or night, given a TOW crew with load bearing equipment (bayonet w/scabbard, entrenching tool, and poncho), individual weapon, TOW weapon system with encased missile, the specific position for weapon location, a sector of fire, and pioneer tools.

NOTE: For training, use missile simulation round instead of encased missile.

STANDARDS:

Supervise the construction and camouflage of a TOW position to meet the following specifications:

1. Position allows squad to engage the enemy in assigned sector of fire.
2. It provides protection for both the weapon and the crew.
3. The size and shape is IAW the performance measures.
4. Position blends with surroundings so that it cannot be easily detected 35 meters to the front (hand-grenade range) and cannot be seen from the air (spoils are covered with grass, leaves, etc., to blend with the surrounding vegetation.)

PERFORMANCE MEASURES:

1. Constructing The Position.
 - a. First, assemble the launcher on position and clear fields of fire. Then, while insuring the sector is observed, outline position and start digging.
 - b. Dig the weapon's position first and add overhead protection for the crew and missiles as time allows. Dig a position 24 inches deep, as in figure 1.

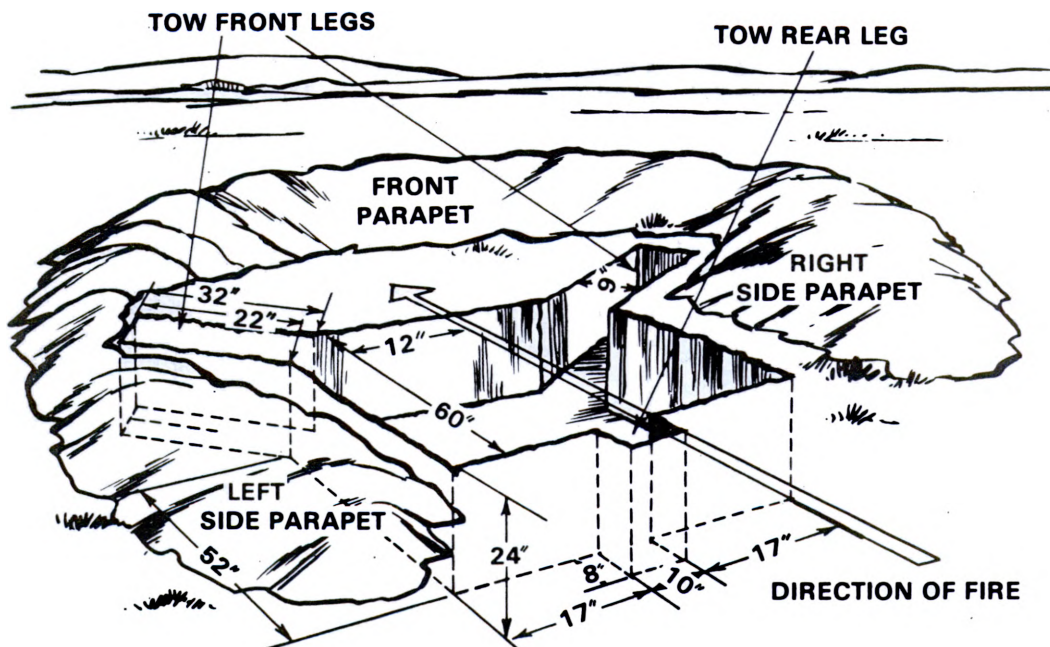


Figure 1

c. Build a parapet to the front and flanks. Protection from small-arms fire and fragments from mortar and artillery rounds is provided by at least 18 inches of dirt. Leave at least 9 inches of clearance under the muzzle of the launch tube. Do not place dirt or equipment in the backblast area. Scoop out a place for the missile guidance set (MGS) either to the front or under the tripod.

d. Disconnect the MGS and place it into the place made for it. Then place the launcher into the position. Reconnect the MGS and check the boresight.

e. Improve the position by adding overhead cover for the crew and missiles. Dig to the flank (90° to the primary direction of fire) and use the strongest material available for the roof. Mechanized units use TOW caps. Put plastic or canvas down before throwing the dirt on the roof. This will help keep the ceiling from leaking. If sandbags are used, cover them with canvas or plastic. Wet sandbags are very heavy and may cave in. Place at least 20 inches of dirt on top of the storage/protective area (fig. 2).

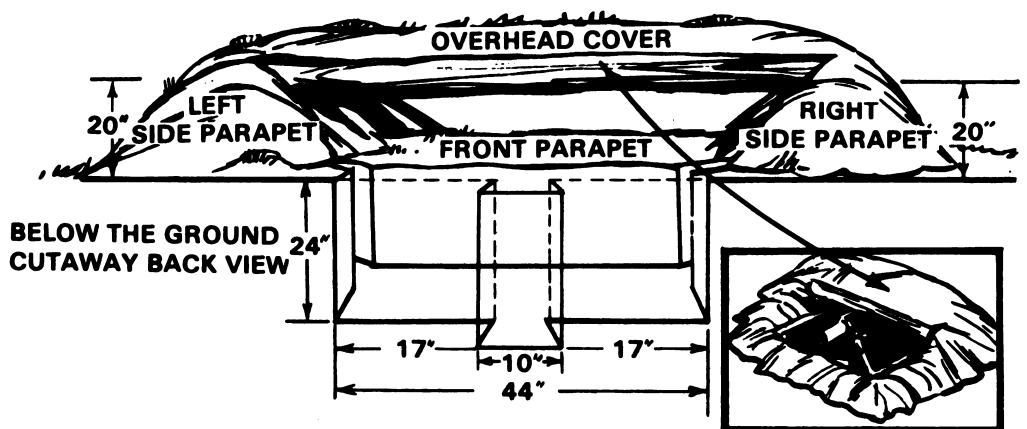


Figure 2

2. Camouflaging The Position.

a. Place sod from the position on the parapet in such a manner that it looks natural and will have a good chance of growing.

b. Cover all fresh dirt with leaves or brush so it blends with the ground around the position.

c. If additional vegetation must be used to break up the outline of the parapet, get it (similar to that found near the position) from far to the rear of the position with root structure intact, if possible. Do not use so much vegetation that the position has more than the surrounding area. Camouflage the holes or cuts from which vegetation was removed.

d. If the position is covered, camouflage it in the same manner as the parapet. If it's not covered, camouflage the position using camouflage nets or available brush, branches, etc., so that it is not visible from above.

e. Replace foliage, if it begins to change color. Attempt to get sod, small trees, plants, etc., used as camouflage to grow so that the position will improve as time passes. Remember, the position can always be improved.

f. Approach the position only from the rear, insuring that a visible trail is not left. Cover all footprints around and leading into and out of the position so they do not point out the position.

g. Do not litter the area nor make unnecessary noise during constructing or camouflaging the position.

h. Do not disturb vegetation not used in constructing or camouflaging the position. The area around the position should look as natural as possible.

3. Kneeling The Launcher.

If being suppressed by an enemy weapon and there is need to further conceal the system, the gunner can kneel (lower) the launcher below ground level.

a. To kneel the launcher:

(1) Have the gunner hold up on the encased missile with his right shoulder.

(2) Release the friction locking handle and detent stop on the rear leg and allow the rear leg to slide back into its notch. The launcher will move back by its own weight.

(3) Depress and lock the launch tube in the full DOWN position so it does not stick above the frontal protection.

b. To raise the launcher:

(1) Lift on the rear of the encased missile and push forward and down on the rear leg. (Elevation and azimuth locks must be engaged.)

(2) Check the level indicators and lock the friction locking handle.

4. Vehicle-Mounted TOW. A fighting position for a vehicle-mounted TOW is a hull-defilade position with a camouflage net erected over the position.

a. The position should look natural and blend with the surrounding terrain. It should not be detected from 35 meters to the front (fig. 3).

b. Be particularly careful with a vehicle to insure that the vehicle does not leave a trail pointing out the position. This is an obvious telltale sign that aerial observers look for. All tracks should be covered.

c. The camouflage techniques for the ground-mounted position apply to the vehicle-mounted position also.



Figure 3

5. After Camouflaging.

a. Insure that the ground behind the TOW (about 25 meters) is free of leaves and dirt so the backblast from the weapon does not leave a signature.

b. Do not leave any evidence of digging. Do not leave equipment laying around. Everything must be concealed or camouflaged.

c. If possible, move to the front of the position, at least 35 meters, and study it. Insure that the position looks natural and blends with its surroundings.

REFERENCE:

None

FM 31-11C-S.

071-316-2651

RECOMMEND EMPLOYMENT OF THE TOW

CONDITIONS:

As an antitank platoon sergeant, given the requirement to employ the antitank platoon in a defensive role, a 1:50,000 scale military map of the area of operations, and the commander's concept of the operation.

STANDARDS:

Recommendation must, as a minimum:

1. Provide for mutual support.
2. Exploit TOW range.
3. Avoid conspicuous terrain features.
4. Provide for flank engagement (when possible).
5. Provide for dispersion.

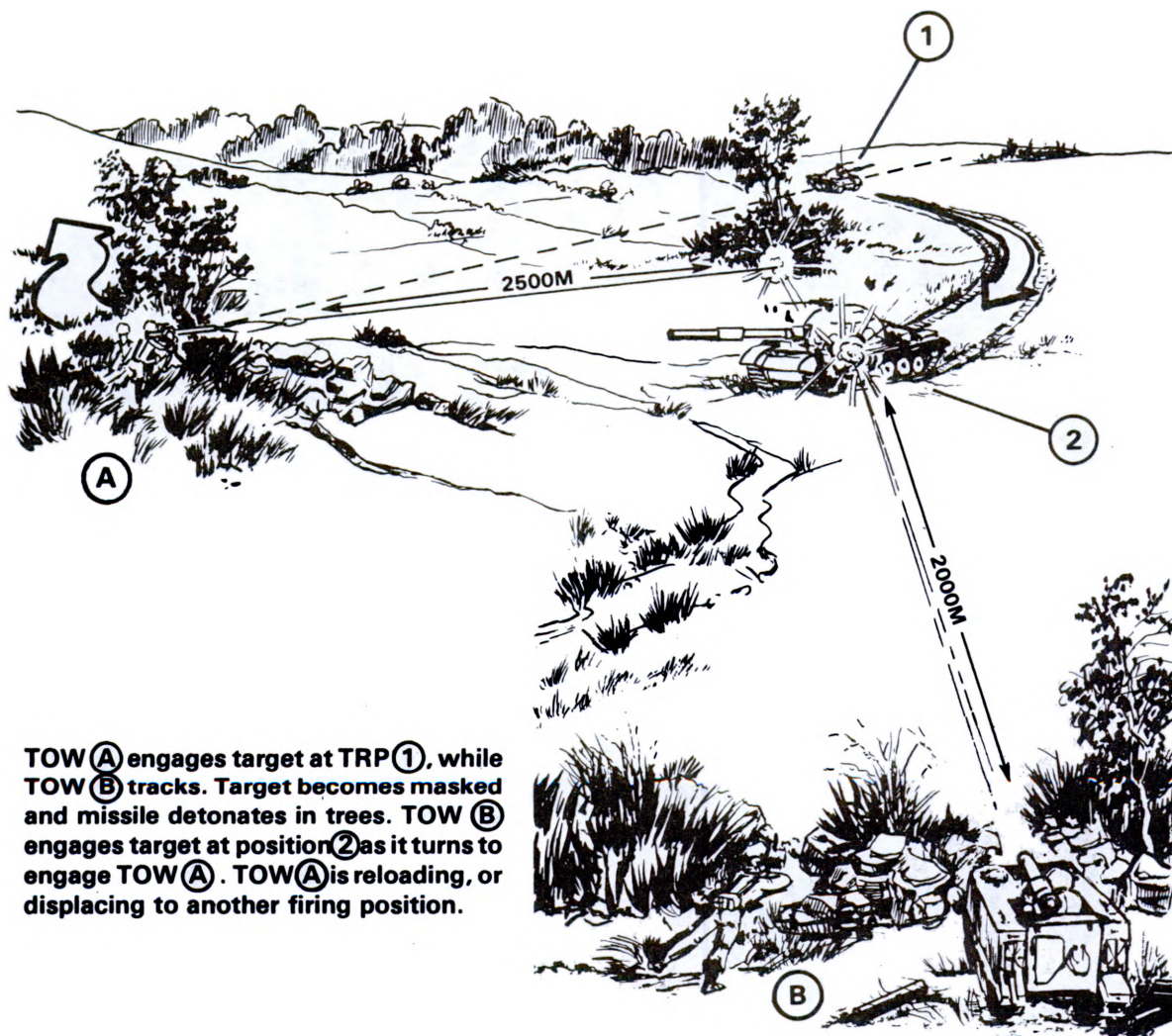
PERFORMANCE MEASURES:

1. General. As with all weapons systems, the TOW has advantages and limitations. Certain basic considerations can be followed in employing the TOW to best advantage.

2. Basic Employment Considerations.

a. Provide for Mutual Support. Mutual support is the help that weapons/units give to each other to make the most of their capabilities and to overcome their limitations.

(1) Employ the TOW in pairs (by section). To insure continuous antiarmor coverage of an assigned sector of fire, TOWs should be employed in pairs with overlapping sectors of fire so they can support each other whenever possible. By doing this, one system can fire while the other is reloading or moving to an alternate position. TOWs should be employed separately only when there is no other way to cover the armor avenues of approach or to overwatch the attacking company zone (fig. 1).



TOW A engages target at TRP ①, while TOW B tracks. Target becomes masked and missile detonates in trees. TOW B engages target at position ② as it turns to engage TOW A. TOW A is reloading, or displacing to another firing position.

Figure 1

(2) Integrate TOW fires with other antiarmor weapons. Position TOWs within range of other antiarmor weapons so they can support each other by fire when under mounted attack. TOWs and tanks should be positioned to provide long-range coverage along the high-speed avenues of armor approach to insure that continuous antiarmor fires are delivered on attacking enemy forces. Dragons and LAWs should be positioned along the armor approaches with more restricted fields of fire to allow TOWs to engage the long-range targets and to add depth to the defensive area.

(3) Integrate TOWs with nearby infantry for security. TOW crews by themselves are extremely vulnerable to attacks by mounted as well as dismounted infantry. To provide security against such attacks, TOWs should be positioned to take advantage of infantry blocking dismounted and concealed mounted approaches leading to TOW positions (fig. 2).

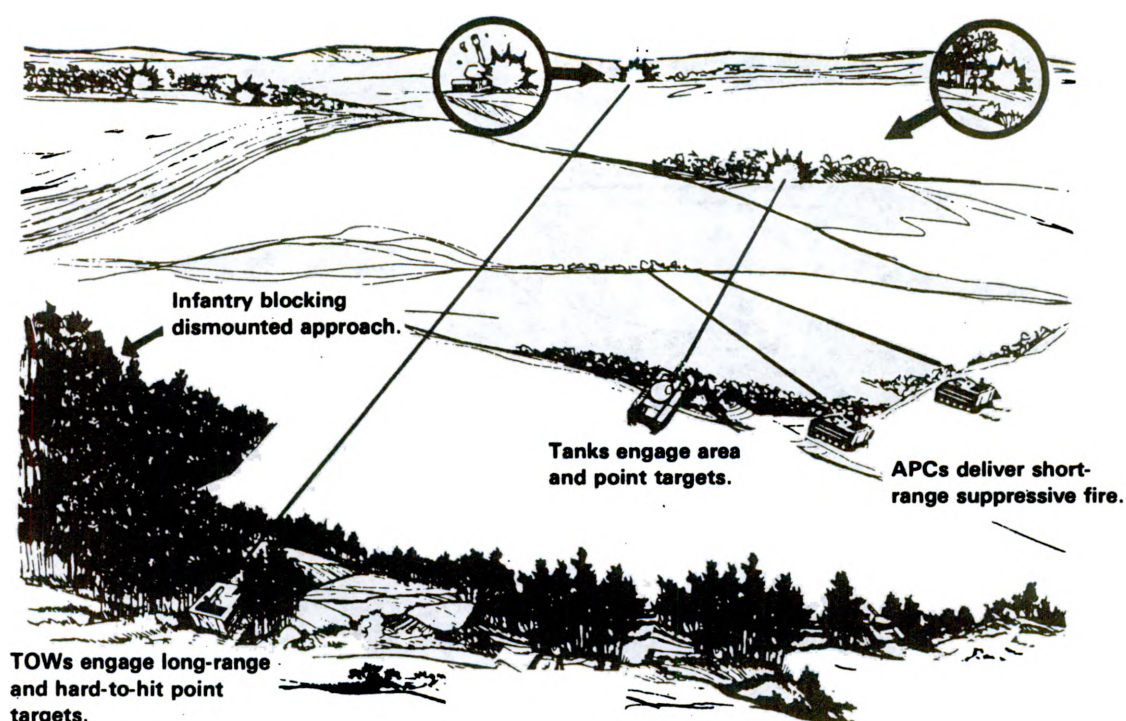


Figure 2

b. Exploit TOW Range. The most significant advantage of TOW is that it is more accurate than most tanks at ranges beyond 1,500 meters. The major limitation is that the TOW crew is exposed to enemy suppressive fires while firing. Therefore, the principal factors to consider when positioning TOW for employment are twofold: EXPLOIT THE CAPABILITIES OF THE WEAPON and PROTECT THE CREW FROM COUNTERMEASURES SUCH AS ARTILLERY AND TANK FIRE. (See fig. 3).

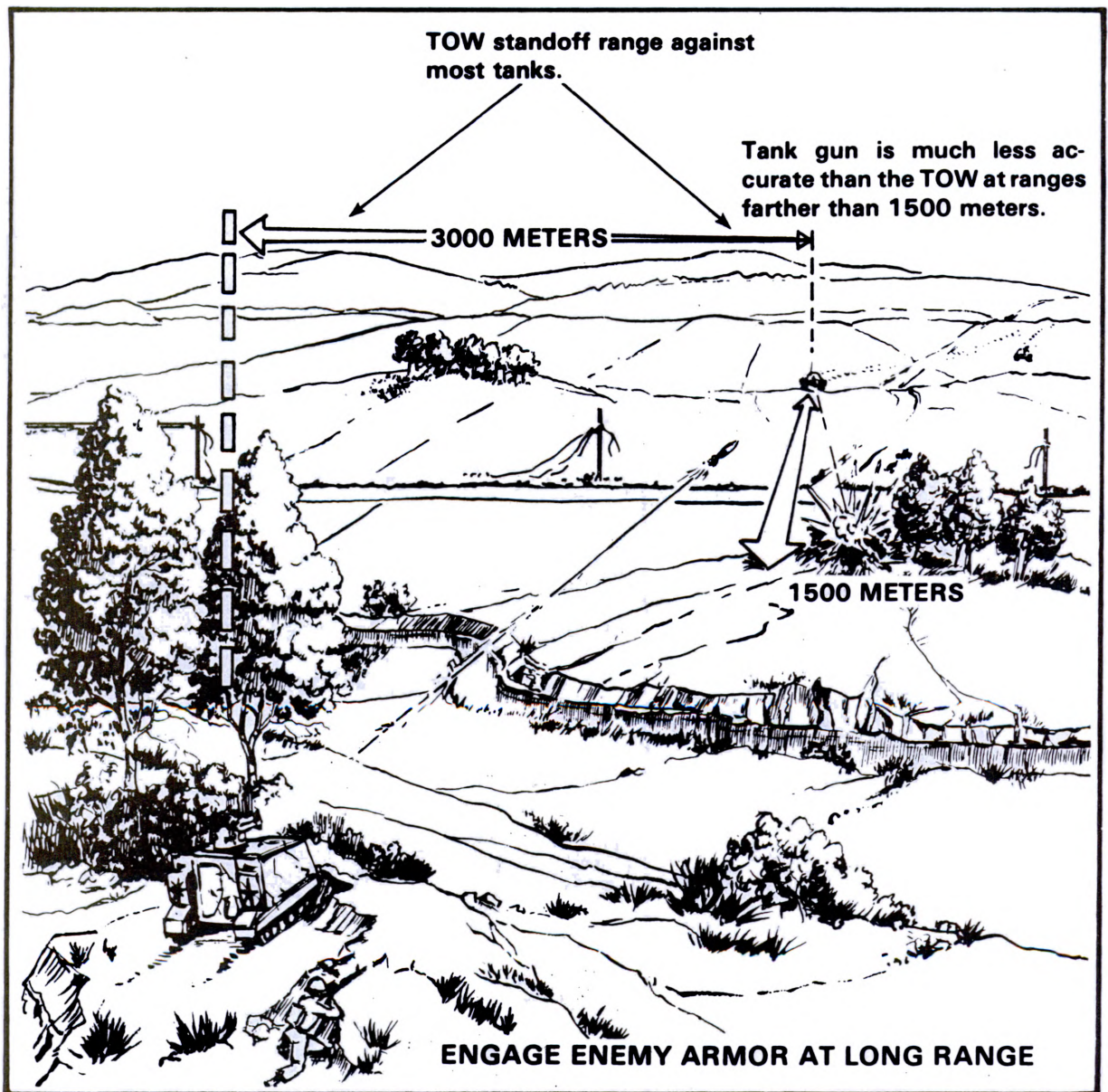


Figure 3

c. **Avoid Conspicuous Terrain Features.** Always use terrain to your best advantage. Virtually every piece of terrain has features that can enhance or degrade mission accomplishment with the TOW. Conspicuous terrain features, such as road junctions, hilltops, lone buildings, or trees, will attract the enemy's attention; and he will probably have registered on them. As a leader, you must be able to recognize those terrain features that will serve the chances for success with the TOW, and lessen its vulnerability to detection. See figure 4 for examples.

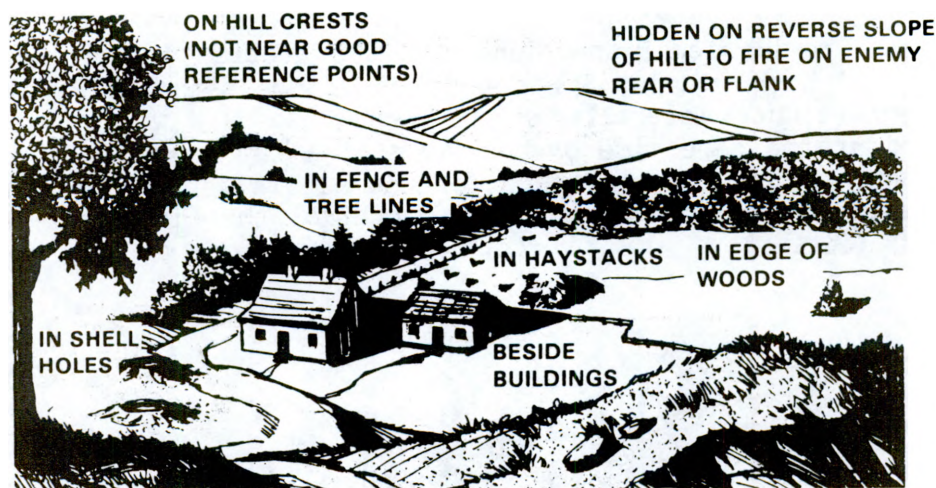


Figure 4

d. **Provide for Flank Engagement.** TOW frontal fire against tanks must be avoided, as a general rule. The crew of a launcher so sited is extremely vulnerable, particularly at shorter ranges. When enemy tanks are advancing, their firepower and observation are oriented to the front, and it is difficult for them to detect and trace a missile launched from a flank (fig. 5).

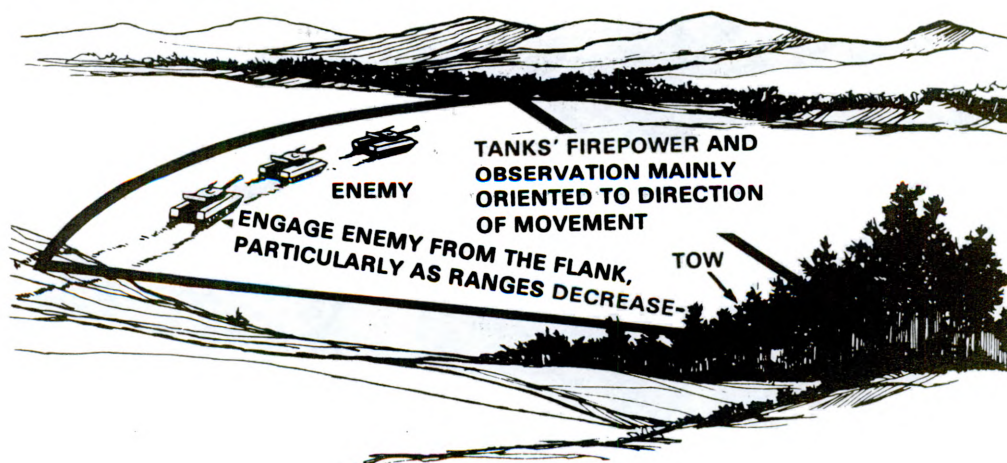
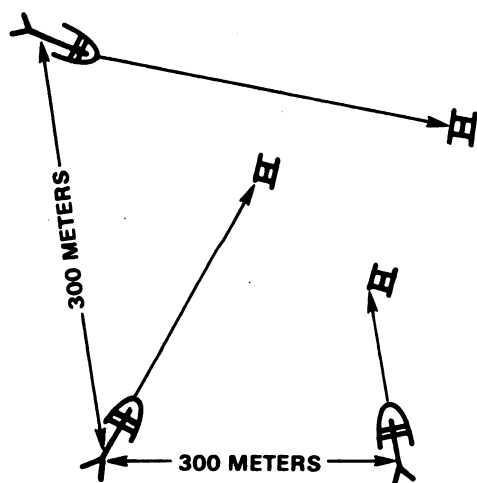


Figure 5

However, a trailing enemy tank may see the launch signature or crew movement and knock the weapon out at once or stalk it from the rear. Therefore, in addition to firing from the flank, the weapon must be sited so that it is in defilade from the direction of the enemy. This means there must be something between the weapon and the tanks not being fired at--a parapet or wall, or natural cover. Flank concealment is necessary, but flank defilade, giving cover from fire, is preferable. Concealment of flash is also essential, not only from the following tanks, but from the enemy's OP as well; a weapon seen is a weapon lost.

e. Provide for Dispersion. If the section leader can control the fires of both squads, TOW squads should be separated a minimum of 300 meters (either laterally or in depth) so no two squads can be suppressed at the same time by the fires of a single volley of artillery from one battery. This separation, of course, is dependent upon terrain and the section leader's capability to control the fire and movement of the squads (fig. 6).



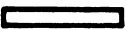
In this sketch, the size of a 152-mm howitzer battery open sheaf, drawn to scale would be only this large: . From this, one can see that it would take large volumes of artillery to effectively suppress such dispersed ATGMs.

Figure 6

REFERENCE:

FM 71-1, The Tank and Mechanized Infantry Company Team, Jun 77 (app C, page C-1 thru C-5)

071-316-2652

PREPARE AND ISSUE AN ORAL
OPERATION ORDER (TOW)

CONDITIONS:

As a section leader/platoon sergeant, given a TOW section/TOW platoon, a company defensive or offensive operation order, and any available pocket-size reference (such as The Infantry Leader's Reference Card, GTA 7-1-27).

STANDARDS:

1. Within the time allotted, develop a clear and concise oral order for the offense, or defense, and issue it to your section/platoon. The order must be issued so that subordinate leaders understand their mission and any specific coordinating instructions.

2. As a minimum, a defensive order must contain:

- a. Mission of the platoon.
- b. Mission of the section.
- c. Location of the defensive position.
- d. Scheme of maneuver.
- e. Type of emplacements and work priority.
- f. Plan for maintaining local security.
- g. Critical signal instructions.
- h. Location of section leader's position and company command posts.

3. As a minimum, an offensive order must contain:

- a. Mission of the platoon.
- b. Mission of the section.
- c. Concept of how the battle will be fought, to include:

- (1) Location of the objective.
- (2) Time of attack.
- (3) Location of the LD or LD/LC.
- (4) Order and route of march.
- (5) Consolidation instructions.
- (6) Location of overwatch positions.

d. Critical signal instructions.

PERFORMANCE MEASURES:

1. Receiving an Operation Order.

a. The most important part of receiving an order is a clear understanding of what your unit has to accomplish in relation to the ground and to the other platoons or squads. Unless you know exactly what you are supposed to do, what the other units are doing, and where and when these actions are to be done, your chances of success are greatly reduced. After hearing the entire order, don't leave until all of your questions have been answered.

b. THINK THROUGH THE ORDER. As soon as you receive the order and understand the leader's plan, take a few minutes to go over the notes you took. As you think about the order, answer these questions:

- (1) What MISSION(S) did I receive?
- (2) How much do I know about the enemy?
- (3) How does the TERRAIN and WEATHER influence the operation?
- (4) What SUPPLIES or EQUIPMENT do I need? Do I need to assign SPECIAL TASKS to anyone?

2. Mission:

a. In analyzing your mission, identify what your unit is to accomplish. Be sure you know how much time you have to prepare. Make sure you are aware of any restrictions or special tasks that apply to your section.

b. A thorough understanding of the mission will allow you to establish a time schedule for your preparation. You will be told what time the operation is to begin and what time your unit must be ready to go. This allows you to allocate time to prepare for the mission. Identify the things that must be done to get ready and, working backwards from the "ready" time, allow your men time to accomplish each task. This technique is called the reverse planning sequence. Here is how it might work for a section leader:

1420: Commander said to be ready.
 1415: Inspect assembly area.
 1400: Inspect squad.
 1315: Issue order to squad leader.
 1300: Finalize section order.
 1200: Reconnoiter with commander/receive order.
 1100: Issue warning order to section.
 1040: Receive warning order.

3. Enemy.

a. Develop the best picture of exactly where the enemy is, what his strength is, and what kind of weapons and equipment he has. Tell your men as much as you know about how to destroy or suppress the kind of enemy you are likely to meet.

b. Sometimes, the enemy in a certain area will use the same pattern over and over. For example, if you know that the enemy habitually ambushes in the vicinity of trail junctions, make sure that all of your men know about it.

4. Terrain and Weather.

a. Most decisions pertaining to route, objective, sectors of fire, movement techniques, etc., are made by the commander. The section leader must study every bit of ground if he is to properly employ his men and equipment and gain an advantage over the enemy. Proper use of terrain will:

(1) Provide cover and concealment before, during, and after the battle.

(2) Increase the effectiveness of your fire.

(3) Decrease the effectiveness of the enemy's weapons.

b. You must also understand how weather can influence your men. Cold, heat, rain, or snow can create problems if you don't prepare your section properly.

5. Supplies, Equipment, and Special Tasks.

a. Resupply of ammunition.

b. Resupply routes.

c. Coordination for resupply of batteries (if applicable).

6. Issuing an Operation Order.

a. After you have received an operation order, thought it through, and prepared your own order, you must issue that order. Whenever possible, the commanders should issue their orders from a position that allows the section leaders to see the ground on which they are going to operate.

b. Section leaders should also try to issue their orders from vantage points that overlook the terrain. However, many times this will not be possible, and they will have to sketch the terrain on the ground. Terrain models are easy to construct and allow the leader to associate his order with terrain features so that each man will have an idea of what to expect once he gets on the actual terrain.

THE OPERATION ORDER

An operation order is nothing more than the presentation of the information and instructions needed to accomplish a specific mission. The amount of detailed information included in your operation order depends on the information you received and the time you have to prepare.

Below is an example of how you can organize your order to insure that you tell your squad leader everything he needs to know to perform the mission you were given. The purpose of this format is to help you prepare your order. Use it as a checklist and remember that it is a guide. Give your order in language that your squad leader can understand. For example, you may prefer to say, "Here's how we are going to get the job done," rather than "Execution."

SITUATION:

Information on enemy and friendly forces to include the mission and intended actions of at least the next higher headquarters and unit on your left and right.

MISSION:

What your section is to accomplish.

EXECUTION:

a. Your tactical plan for accomplishing the mission; for example:

(1) Plan and control TOW section fire (defense).

(2) General location of firing positions (primary, alternate, supplementary positions) (offense).

(3) Overwatch positions (offense).

b. Tasks (missions) of each squad (the platoon order) or of teams and individuals (the squad order).

SERVICE SUPPORT:

Administrative information to include the plans for ammunition, resupply, casualty evacuation, and rations.

COMMAND AND SIGNAL:

a. Signals and other control measures to be used during the operation.

b. Where you will be during the operation and where the next higher leader will be.

REFERENCE:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (chap 2, sec III, pages 2-11 thru 2-18)

071-316-2800

MANAGE TOW BATTERY PROGRAM

CONDITIONS:

As an antiarmor platoon sergeant, given TOW battery charger(s) (PP-4884 (XO-1)/T), TOW batteries, an AN/TAS-4 nightsight battery charger(s) (PP-7382/TAS) and batteries, and one generator.

STANDARDS:

As a minimum, insure that:

1. TOW batteries are recharged on a monthly basis and AN/TAS-4 nightsight batteries are recharged after 2 hours of use.
2. Battery accountability is maintained.
3. Defective batteries are identified and replaced.
4. Required preventive maintenance on both batteries and chargers is performed in accordance with applicable technical manuals (TMs).

PERFORMANCE MEASURES:

1. **BATTERY PROGRAM MANAGEMENT.** To effectively manage a unit battery program:

a. First, develop a means of identifying when batteries are due for recharging. To do this, design your own battery control log/chart showing the battery numbers, condition of the batteries, and the date upon which the batteries were last charged (fig. 1).

BATTERY CONTROL				
BATTERY NO.	CONDITION/STATUS	CHARGED	DUE FOR RECHARGE	DATE TURNED IN
1	GOOD	16 MAR 79	16 APR 79	
2	DEFECTIVE	-----	-----	17 MAR 79

Figure 1. Example battery control log/chart.

b. Maintaining a log/chart will insure that all batteries are recharged on a timely basis, assist in identifying batteries that require excessive charging (indicating that they might be defective), and assist you in maintaining battery accountability.

c. Label all batteries after recharging.

NOTE: Batteries normally have a plastic-coated plate attached with spaces provided in which the day, month, and year can be written with a grease pencil or water-soluble ink, or you may attach a strip of masking tape to the batteries and record date (day, month, and year).

d. Insure that personnel turn in TOW batteries for recharging every 30 days (whether the batteries were used or not).

e. Insure that personnel rotate the use of their batteries; a battery that is never charged or discharged may lose some of its ability to hold a full charge.

f. Batteries for the AN/TAS-4 nightsight (when issued) should be charged for a duration of 15 hours (\pm 45 minutes) for (approximately) 2 hours of use.

NOTE: When the battery monitor in the nightsight indicates that the charge is down to less than 10 minutes, the battery should be recharged.

2. PREVENTIVE MAINTENANCE OF BATTERIES AND CHARGERS.

a. Insure batteries are kept clean.

b. Visually inspect for damage and wear.

c. Spot paint as needed.

d. Insure that operator's and organizational maintenance is performed on the TOW battery charger (PP-4884 (XO-1)/T) in accordance with TM 9-6130-470-12 (chap 3, pages 3-1 through 3-3) and on the nightsight battery charger (PP-7382/TAS) in accordance with TM 11-5855-254-14 and P (chap 4, pages 12-18).

REFERENCES:

TM 9-6130-470-12, Operator's and Organizational Maintenance Manual for Battery Charger PP-4884 (XO-1)/T, Dec 75 (chap 3, pages 3-1 thru 3-3)

TM 11-5855-254-14 and P, Operator's Organizational, Direct Support,
General Support Maintenance Manual Including Parts and Special Tools
List for Battery Charger PP-7382/TAS, Jun 79 (chap 4, pages 12-18)

071-316-2801

CONSOLIDATE AND REORGANIZE A TOW
SECTION FOLLOWING ENEMY CONTACT

CONDITIONS:

As a section leader attached or organic to a unit that has just repelled an enemy assault (defense) or has just seized an objective (offense).

STANDARDS:

Consolidate/reorganize your section well enough to:

1. Reestablish chain of command.
2. Redistribute ammunition.
3. Supervise evacuation of dead or seriously wounded.
4. Resupply ammunition.
5. Compensate for personnel losses.
6. Prepare to continue the attack (offense).
7. Replace camouflage (defense).
8. Restore communications (defense).

PERFORMANCE MEASURES:

1. Consolidation and Reorganization--Offense. The section leader must plan the required consolidation and reorganization of the objective and include the plan in his attack order to the squad leaders. The plan is tentative and flexible and may be changed as the situation requires, but it must be complete and in as much detail as possible.

a. Consolidation is the organizing and strengthening of a newly captured position to secure it against a counterattack. The plan for consolidation includes a sector of fire for the section.

(1) Upon seizure of the objective, initial emphasis is on a hasty defensive posture to prevent a successful enemy counterattack. You must observe along enemy approaches.

(2) Request from the commander the general location and the sector of fire of your section.

(3) Make necessary corrections in fire planning and coordination.

b. Reorganization is the restoration of order in your section and all actions necessary to prepare your section for further combat.

(1) Reestablish the chain of command. Insure that all key positions are filled by the remaining section members and that all members are made aware of the new chain of command.

(2) Evacuate casualties and request replacements.

(3) Redistribute ammunition within the section.

(4) Resupply ammunition. Pick up ammunition at a predesignated point, if coordinated, or take a quick inventory and request resupply through command channels.

(5) Insure that TOWs are manned and positioned to cover assigned sector of fire.

(6) Give your commander a situation report (SITREP) that includes the tactical situation, personnel strength, and ammunition-vehicle-weapon status.

(7) Plan for maintenance on TOWs and vehicles, where applicable, and if tactical situation allows it.

2. Consolidation and Reorganization--Defense. When an enemy assault is repelled, you must immediately prepare your section to meet a renewed assault. To accomplish this task, you must follow many of the same procedures used for the reorganization after an offensive action.

a. Reestablish the chain of command.

b. Redistribute/resupply ammunition.

c. Request instructions for location and sector of fire of TOW section.

d. Reestablish communication. Check wire to insure that it was not cut during the attack. Change your pyrotechnic signals if you think the enemy may have learned what they mean.

e. Evacuate and replace casualties.

f. Restore camouflage and improve positions. Take care not to overcamouflage a position. If it was not found during the first assault, chances are it will not be found during the next try.

g. Resupply after inventory is taken and submit requests for all needed supplies.

REFERENCE:

None

FM 31-11C-S

071-326-0601

USE VISUAL SIGNALS TO CONTROL MOVEMENT
(MOUNTED)

CONDITIONS:

Given a combat or field training situation with necessary flags or flashlights and you are moving mounted. Radio communications may or may not be available, and radio silence may or may not be imposed.

STANDARDS:

1. Demonstrate the correct procedure for each signal in the performance measures below.

2. Train each member of your squad to recognize each signal and require them to take the appropriate actions.

PERFORMANCE MEASURES:

1. Visual communication is a means available to all units. Visual signals are transmitted by flags, lights, pyrotechnics, panels, arm-and-hand signals, and other prearranged methods. They are suitable for transmitting prearranged messages rapidly over short distances as well as for recognition and identification of friendly forces.

2. Visual signals also facilitate ease in controlling the action(s) or movement(s) of the follower; and conversely, visual signals can influence the action(s) or movement(s) of the leader.










3. It is important that you familiarize yourself with all the visual signals used on the battlefield. However, it is more important that you know those signals which can assist you in performing your specific job effectively in the event alternate means of communication are not available.

4. Signals for combat formations and battle drill:

a. These signals may be used, as appropriate, by either mounted or dismounted troops. They give the soldier a means of communication between himself and other persons or units. They must be practiced until their use becomes second nature. Signals must be given correctly and distinctly.

b. When a movement or action is to be executed by less than the total unit, the signaler will point, if necessary, toward the person(s) or element(s) of a unit as a warning that a signal will follow. However, when a movement or action is to be executed by the entire unit, the proper signal should be preceded by the signal "ATTENTION." Most signals may be given from the ground or from a vehicle. Unless otherwise indicated in the illustrations, the signaler will face the person(s) or elements(s) for which the signal is intended.

5. Listed below are selected visual signals. You should know these standard arm-and-hand signals.

SIGNALS TO CONTROL VEHICLES		
 <p>START ENGINES or PREPARE TO MOVE. Simulate cranking of engines by moving arm in a circular motion at waist level.</p>	 <p>STOP ENGINES. Draw right hand palm down, across the neck in a "throat cutting" motion from left to right.</p>	 <p>CHANGE DIRECTION. Raise hands to shoulder level in front of the body. Form clenched fist on arm in direction turn is to be made. Make beckoning motion with other arm to bring vehicle forward. To reverse, make pushing motion.</p>
 <p>DISMOUNT or TAKE A PRONE POSITION. Extend arm side-ward at an angle 45° above horizontal, palm down, and lower it to side. Both arms may be used in giving this signal. Repeat until understood.</p>	 <p>MOVE (the vehicle(s)) FORWARD or COME FORWARD. Move hand(s) backward and forward with palm(s) toward the chest as if pulling the vehicle.</p>	 <p>MOUNT. With the hand extended downward at the side, with the palm 45° out, raise arm side-ward and upward to an angle of 45° above the horizontal. Both arms may be used when giving this signal. Repeat until understood.</p>
 <p>MOVE IN REVERSE (backup). Face the unit (vehicle) being signaled, raise hands to shoulder, level palms to front. Move hands forward and backward as if pushing vehicle away.</p>	 <p>BUTTON UP or UNBUTTON. To signal BUTTON UP, place both hands, one on top of the other, palms down on top of the helmet, with both arms back and in the same plane as the body. To signal UNBUTTON, give the BUTTON UP signal, then separate the hands, moving them slightly to each side in a slicing motion; repeat.</p>	 <p>NEUTRAL STEER (tracked vehicles). Cross wrists at throat, point index finger in direction steer is to be made. Clench fist of other hand.</p>



CLOSE UP DISTANCE BETWEEN VEHICLES AND STOP. Face the vehicle being signaled and extend forearms to the front, palms inward and separated by at least the width of the shoulders. Bring palms together as the distance shortens. The vehicle must stop when the palms come together.



STOP. (Alternate signal used to stop tracked vehicles.) Clasp the hands together, palms facing each other, at chin level.



RAISE RAMP. (For use with vehicles with ramps.) Make circular motion with either hand at head level and the other arm extended across body.



LIGHTS OFF. Index finger of right hand pointing toward eye and "thumbs down" signal with left hand.



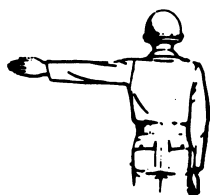
LIGHTS ON. Index finger of both hands pointing toward eyes.



LOWER RAMP. (For use with vehicles with ramps.) Make circular motion with either hand pointing to the ground.



RIGHT TURN or COLUMN RIGHT. Extend right arm horizontally to the side, palm to the front.



LEFT TURN or COLUMN LEFT. Extend left arm horizontally to the side, palm to the front.

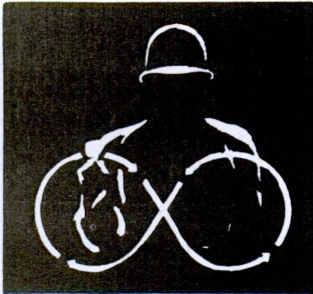


ATTENTION. Extend the arm sideways, slightly above horizontal, palm to the front; wave arm to and away from the head several times.

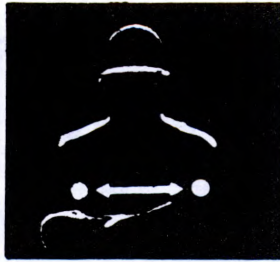


PASS AND KEEP GOING. Extend left arm horizontally to the side, palm to the front, and describe large circles to the front by rotating arm clockwise from the elbow.

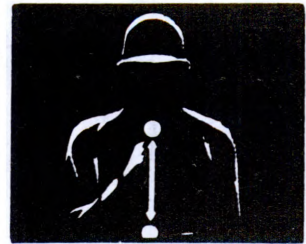
USING A FLASHLIGHT TO CONTROL VEHICLES



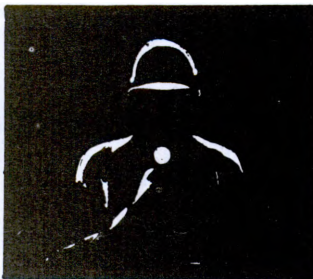
START ENGINES. Move the light to describe a horizontal figure 8 in a vertical plane in front of the body.



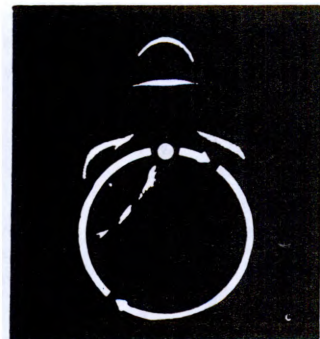
STOP or STOP ENGINES. Move the light horizontally back and forth several times across the path of approaching traffic to stop vehicles. Use the same signal to stop engines.



GO; FORWARD; MOVE OUT; INCREASE SPEED; or DOUBLE TIME. Move the light vertically several times in front of the body.



MOVE IN REVERSE (for vehicles which are not moving) or **SLOW DOWN** (for vehicles which are moving). Hold the light at shoulder level and blink several times toward the vehicles.



TURN LEFT (RIGHT). Rotate light to describe a circle 12 to 18 inches in diameter in the desired direction of the turn

REFERENCES:

FM 7-7, The Mechanized Infantry Platoon and Squad, Sep 77 (app D, page 3)

FM 21-60, Visual Signals, Dec 74 (chap 2, pages 2-15 thru 2-18)

071-329-1019

USE A MAP OVERLAY

CONDITIONS:

Given a military map and a map overlay containing any of the graphic symbols shown in figure 2.

STANDARDS:

Without the use of references:

1. Draw all graphic information on the overlay, to within 100 meters on the map, using grid coordinates or terrain features.
2. State the meaning of each graphic symbol.

PERFORMANCE MEASURES:

1. Map overlays consist of the following:
 - a. Orientation. A means by which the overlay is positioned on a map.
 - b. Plotting of detail. Information pertaining to a specific mission or operation is shown using graphic symbols.
 - c. Marginal information. The overlay title, date and time of information, map reference, who prepared the overlay, and any nonstandard graphic symbols used or other additional information needed to use the overlay. It is placed in a corner of the overlay, usually the lower right.

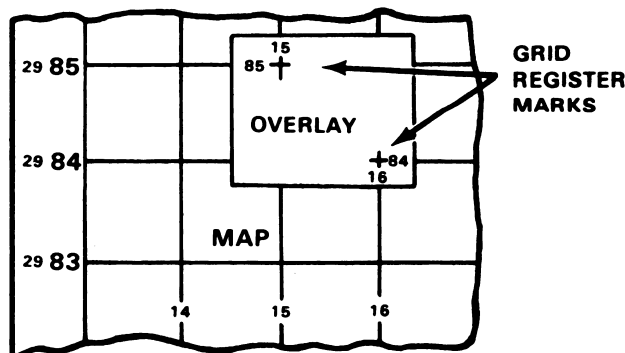


Figure 1. Registering the overlay.

d. Classification. The security classification is entered at the top and bottom of the overlay. Make certain that you handle overlays as you would documents with similar classification.

2. To use the map overlay:

a. Obtain the map sheet(s) listed in the marginal information.

b. Locate the grid intersections on the map which correspond to the grid register marks located in opposite corners of the overlay.

c. Place the overlay on the map so that the grid register marks fall exactly on top of the grid intersections (figure 1).

d. Since the overlay material is semitransparent, you will be able to see the map through it. Therefore, you can identify map locations (by coordinates or terrain features) to which the graphic information pertains.

e. Locate the points and areas identified on the ground.

f. Take action appropriate to the graphic information given.

3. As a minimum you must be able to recognize the graphics in figure 2 without the aid of any references.

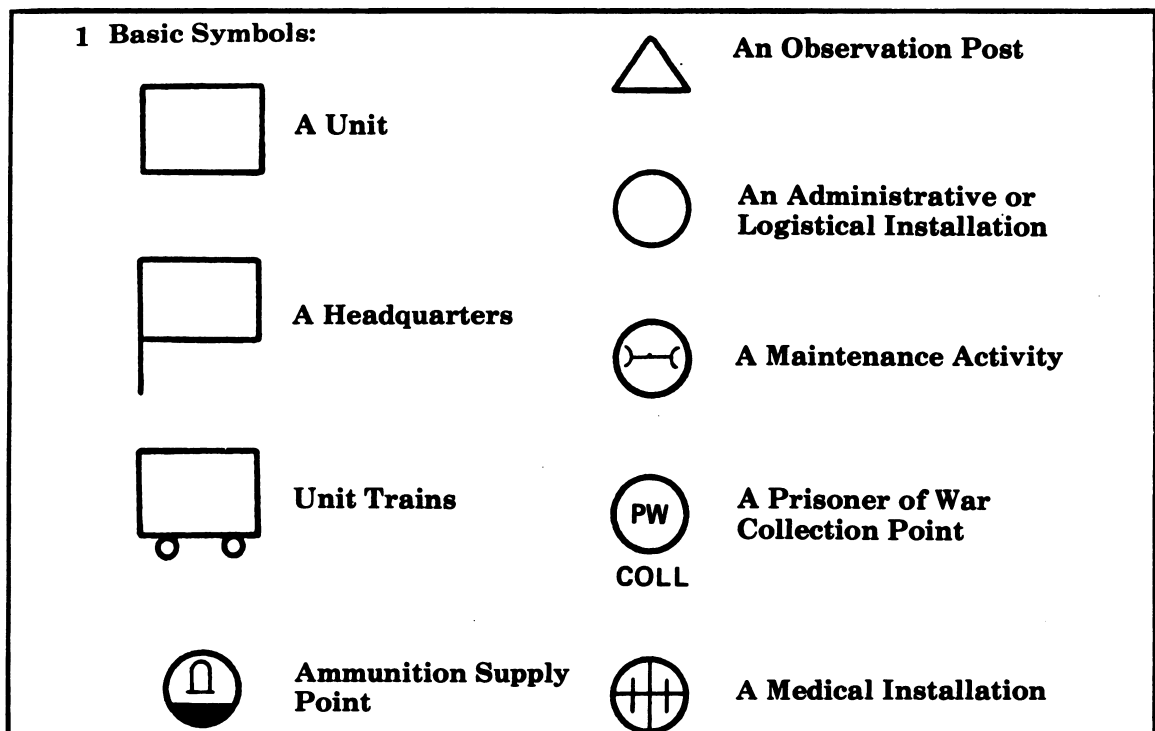
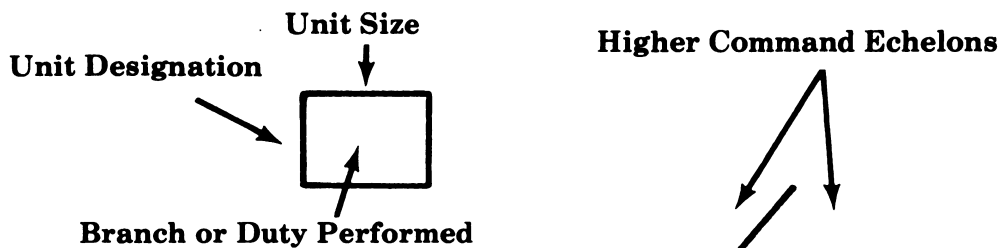


Figure 2

2 Development of a unit symbol:**3 Unit Size Symbols:**

● Squad	Company, Battery or Troop	▤ Task Force (Bn Size)
● ● Section	▤ Team (Company Size)	▤▤ Regiment or group
● ● ● Platoon	▤▤ Battalion or Squadron	× Brigade

4 Branch symbols:

× Infantry	⊗ Mech Inf	▬ Supply
◯ Armor	⊗ Arm Cav	⌢ Maintenance
● Artillery	⚡ Signal	~ Airborne
▤ Engineer	+ Medical	

5 Enemy units are depicted in red or as double lines:**6 Proposed or future locations are depicted using broken lines:**

Figure 2. Continued.

7 Tactical control measures:

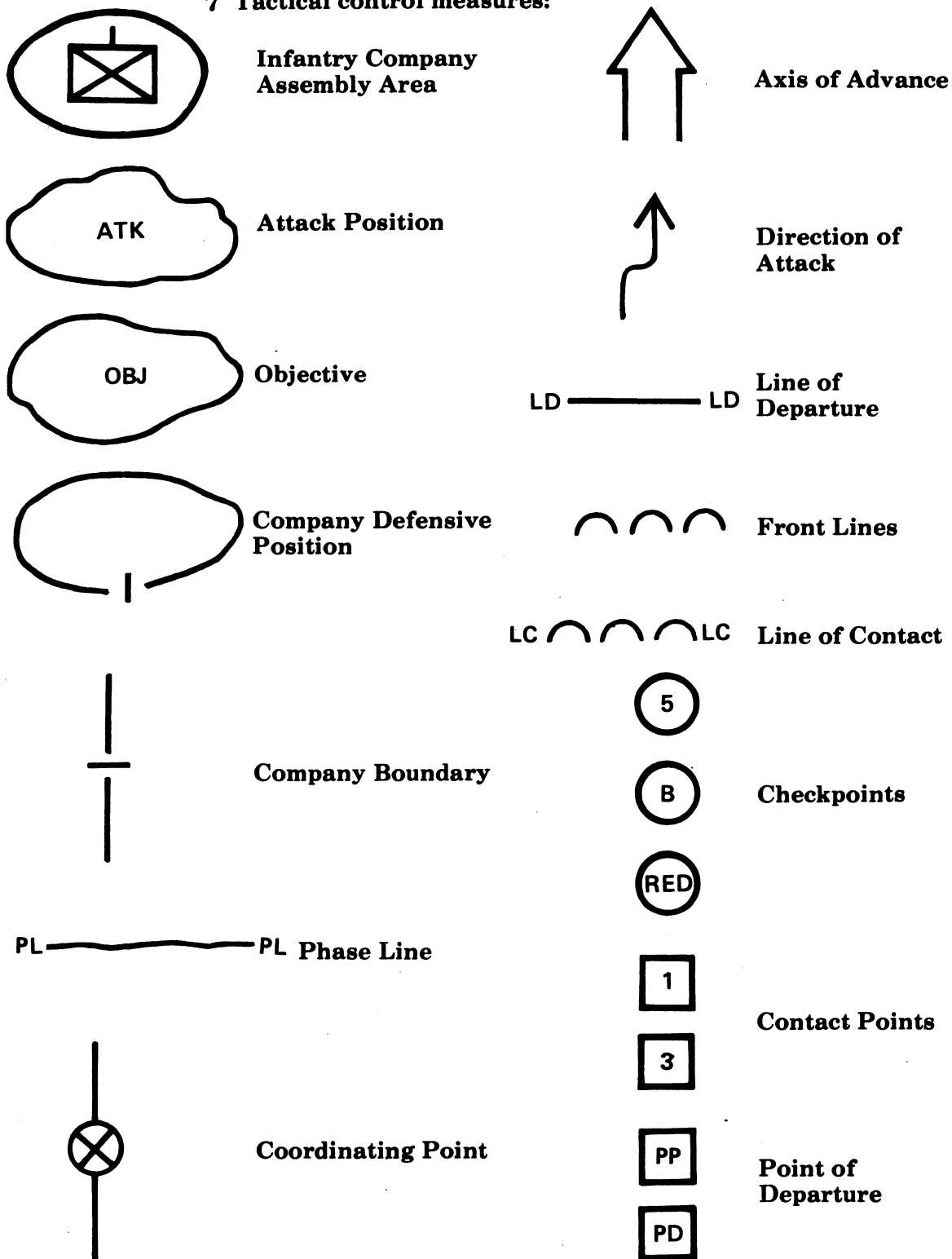
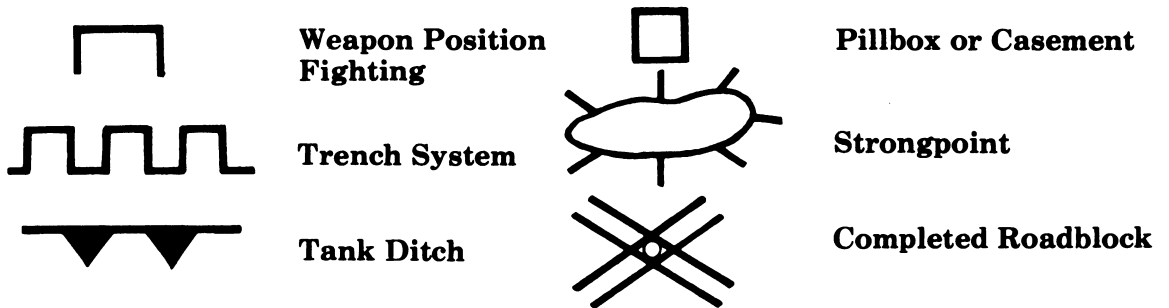


Figure 2. Continued.

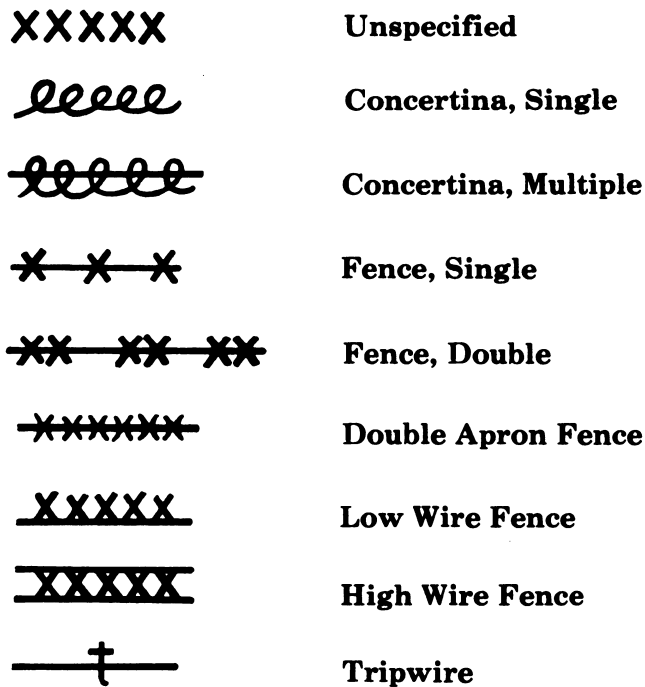
8 Weapons symbols:**Automatic
Infantry
Weapons****Light****Medium****Heavy****Mortars****Light****Medium****Heavy****Antitank
Rocket
Launchers****Light****Medium****Heavy****Recoilless
Rifles****Light****Medium****Heavy****Antitank
Missile
or Rocket****Light****Medium****Heavy****(81-mm
Mortar)****(LAW)****(Dragon)****(TOW)****9 Armored vehicles:****Tank****Light****Medium****Heavy****APC****Light****Medium****Heavy**

Figure 2. Continued.

10 Fortifications and obstacles:



11 Wire:



12 Mines:

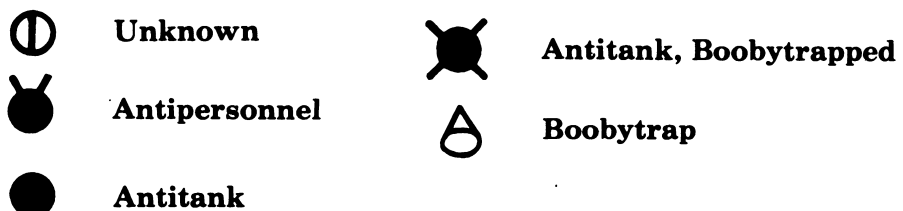


Figure 2. Continued.

1 3 Indirect fire symbols: **AB0010 Target (w/number)** **RP Reference Point** **Final Protective Fire
(FPF)**

Figure 2. Continued.

REFERENCES:

FM 21-26, Map Reading, Jan 69 (chap 7, pages 7-1 thru 7-4, para 7-1 thru 7-3)
FM 21-30, Military Symbols, May 70 (chap 2, pages 2-2 thru 2-4, app E and F, pages E1 thru F7)

071-335-0021

PERFORM PREOPERATIONAL INSPECTION ON THE M202A1
AND M74 ROCKET CLIP

CONDITIONS:

Given an M202A1 rocket launcher and an M74 rocket clip.

NOTE: For training purposes use inert or dummy rocket clips.

STANDARDS:

Within 2 minutes perform a preoperational inspection of the rocket launcher and M74 rocket clip in accordance with the performance measures.

PERFORMANCE MEASURES:

1. Preoperational inspection of the M202A1 rocket launcher (fig. 1).

a. Visually inspect the exterior for:

- (1) Loose or missing parts.
- (2) Dents and cracks.
- (3) Separations and loose fiberglass.

(4) Check next to the data plate on the left side of the launcher for the number "2."

NOTE: If the number "2" does not appear next to the data plate, turn the launcher in for application of MWO. The launcher should not be fired.

b. Check the reflecting sight for:

- (1) Dents and missing or loose parts.
- (2) Insure the sight lock can be placed in both the firing and stowed positions.
- (3) Place the sight in the firing position.

(a) Lift the lens cover.

(b) Sight through the lens and check for improper alinement of the reticle, obscured vision, or a broken reticle.

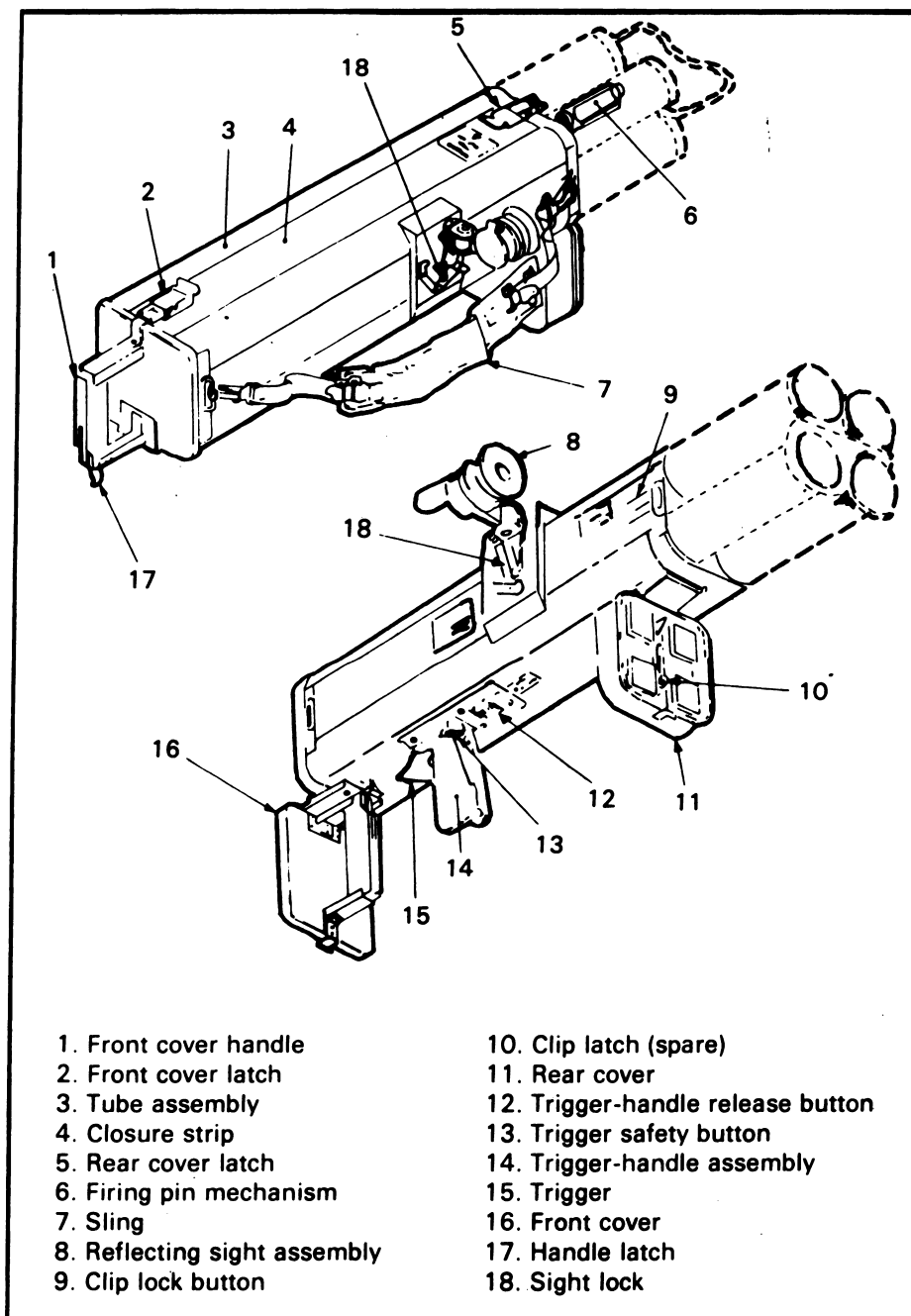


Figure 1

c. Perform a function check.

(1) Unfasten the latch on the rear dust cover and rotate the cover down. Insure the latch, hinge, and cover are serviceable.

(2) Check the front cover trigger-handle system as follows:

(a) Unfasten the latch on the front dust cover (fig. 1, item 2).

(b) Rotate the front cover handle outward until it stops (fig. 1, item 1).

(c) Rotate the front cover below the launcher tube. *Apply sufficient pressure to release the trigger-handle from its retracted position (fig. 1, item 14).

NOTE: If the trigger will not release, check to insure the front cover is in a fully locked position.

(d) Pull the trigger-handle assembly down and lock it into position.

(3) To check the firing pin mechanism assembly (fig. 1; item 6) and trigger safety (fig. 2, item 3):

(a) Firmly holding the firing pin mechanism assembly, fully extend the firing pin mechanism housing from the launcher. Do not allow the firing pin housing to rotate.

.....
 | WARNING. Insure that the firing pins do not extend more than 1/8-inch |
 | past their rubber seals. Accidental firing of the rocket clip may occur |
 | when loading the rocket clip into the launcher. |
 | |

(b) Place the trigger safety in the "FIRE" position and pull the trigger. The firing pin should protrude from the housing. This may be observed from the rear of the launcher.

(c) Move the trigger safety to the "SAFE" position and pull the trigger. The trigger should not operate.

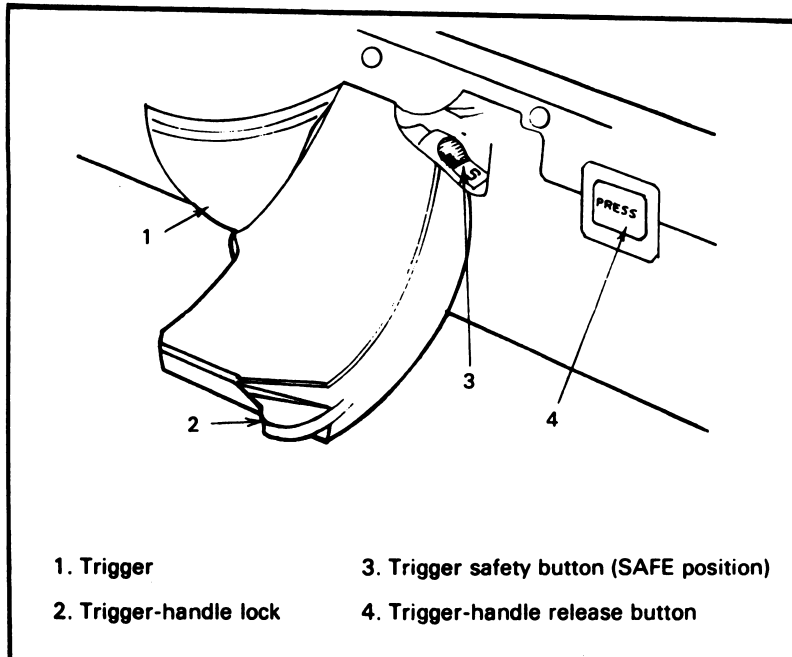


Figure 2.

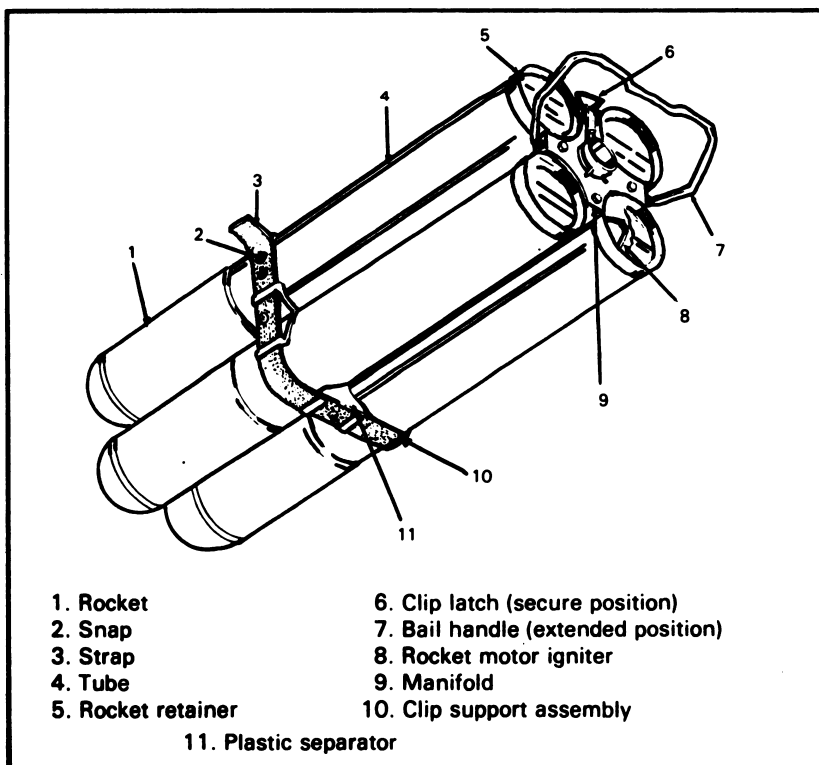


Figure 3.

(d) Retract the firing pin housing back into the launcher.

d. Inspect the interior of the launch tubes for:

- (1) Dents and cracks.
- (2) Frayed or loose fiberglass.
- (3) Visible signs of burns in any tube.

(4) Sand, dirt, or other foreign matter which could damage the rocket warhead when fired.

2. Preoperational inspection of the M74 incendiary rocket clip (fig. 3).

 WARNING. The filler may ignite upon exposure to air. Dents or signs of leakage require that the clip be immediately abandoned. All personnel will move to a safe distance of 60 meters as rapidly as possible. EOD personnel will be notified.

- a. Inspect for leaking rockets.
- b. Loose warheads.
- c. Bail not under spring tension.
- d. Dented rocket canister.
- e. Rust or corrosion or other foreign matter such as sand or dirt.
- f. Insure the clip latch is present and each rocket has a retainer.

NOTE: If the clip latch is missing, a spare latch is stored in the rear cover of the launcher.

3. The rocket launcher and rocket clip are now ready for loading, if both components passed the above inspection. Any defects or deficiencies should be reported immediately to your supervisor.

REFERENCE:

TC 23-2, 66mm Rocket Launcher M202A1, Apr 78 (chap 2, pages 2-1 thru 2-3, para 2-2, 2-3, and 2-4)

FM 31-11C-S

071-335-0022

LOAD AND UNLOAD THE M202A1 ROCKET LAUNCHER

CONDITIONS:

Given an operational M202A1 rocket launcher and an M74 incendiary rocket clip, either in a field environment or classroom.

NOTE: For training purposes, use inert rocket clip.

STANDARDS:

1. Within 1 minute, load the incendiary rocket clip into the rocket launcher in accordance with the performance measures below.
2. Prepare the launcher for carrying.
3. Within 1 minute, unload launcher and restore to carrying configuration (if the rocket is not to be reloaded).
4. Within 90 seconds, unload and reload the launcher, if required.

PERFORMANCE MEASURES:

1. To load the launcher.
 - a. Place the launcher on the ground with its front cover closed and the front cover handle in the stowed position (fig. 1).
 - b. Release the rear cover latch and rotate it down and beneath the launcher.
 - c. Support the rocket launcher by placing the left hand on the sight.
 - d. Partially insert the warheads of the rocket clip into the rear of the launcher tubes.
 - e. Remove the clip support assembly:
 - (1) Grasp the end of the clip support strap nearest the two black snaps.



Figure 1. Inserting the rocket clip into the rocket launcher.

(2) Pull outward to remove the strap and plastic separators from the rocket clip.

f. Once the clip support assembly has been removed from the rocket clip, depress the clip lock button on the rocket launcher and insert the rocket clip into the rocket launcher.

NOTE: You should hear a "click" as the clip latch locks onto the firing pin assembly.

(1) If not, press firmly on the rear of the rocket clip. The clip latch should lock onto the firing pin assembly.

(2) To check, pull outward on the bail.

(3) If the firing pin assembly remains attached to the clip latch manifold, the firing pin assembly is locked in position.

g. Make a manual and/or visual check to be sure that the prongs of the clip latch are seated in the clip attachment slot of the firing pin mechanism assembly.

NOTE: If the launcher is to be fired immediately, see task: Prepare the M202A1 for Firing.

2. To prepare the launcher for carrying.
 - a. Close and latch the rear cover of the launcher.
 - b. Adjust the sling and place the loaded launcher on your shoulder.
3. To unload the launcher after all rockets are fired.
 - a. Place the launcher on the ground, resting on the front and rear dust covers. Be sure that the rear dust cover folds down against the rocket clip for stabilization.
 - b. Remove the clip latch from the clip manifold with the combination tool provided (fig. 2).



Figure 2. Removing the clip latch.

c. Depress the clip lock button on the launcher, grasp one of the two top rocket tubes, and remove the rocket clip by pulling it rearward (fig. 3).



Figure 3. Removing the rocket clip.

d. Reseat the firing pin housing in the launcher by rotating the firing pin housing slightly so it will slide back into the launcher.

e. Close and lock the dust cover.

NOTE: 1. If the launcher is to be reloaded, go back to performance measure 1.

2. If the launcher is not to be reloaded, perform steps 3f through h.

f. Depress the sight lock and rotate it into the stowed position.

g. Depress the trigger handle release button and push the trigger handle forward releasing the front dust cover from the locked position. Close and lock the front dust cover.

h. Prepare the launcher for carrying (see performance measure 2).

REFERENCES:

TC 23-2, 66mm Rocket Launcher, M202A1, Apr 78 (chap 2, pages 2-4 thru 2-6, para 2-5; page 2-20, para 2-14)

071-335-0023

PREPARE THE M202A1 ROCKET LAUNCHER FOR FIRING

CONDITIONS:

Given an M202A1 rocket launcher, loaded with the M74 rocket clip.

NOTE: For training purposes, use an inert M74 rocket clip.

STANDARDS:

1. Extend and arm the launcher in accordance with performance measures.

2. Restore the launcher to carrying configuration if not fired.

PERFORMANCE MEASURES:

1. Place the launcher on the ground resting on its (closed) front cover with the front cover handle in the stowed position (fig. 1).

2. Open the rear cover by releasing the rear-cover latch and rotate it down and beneath the launcher.

a. Grasp the bail handle and pull the rocket clip outward until it is fully extended and locked into position.

NOTE: You should hear a "click" indicating that the rocket clip is locked.



Figure 1

b. Release the bail handle, insuring that it folds against the rear edge of the clip in the downward position (fig. 2).

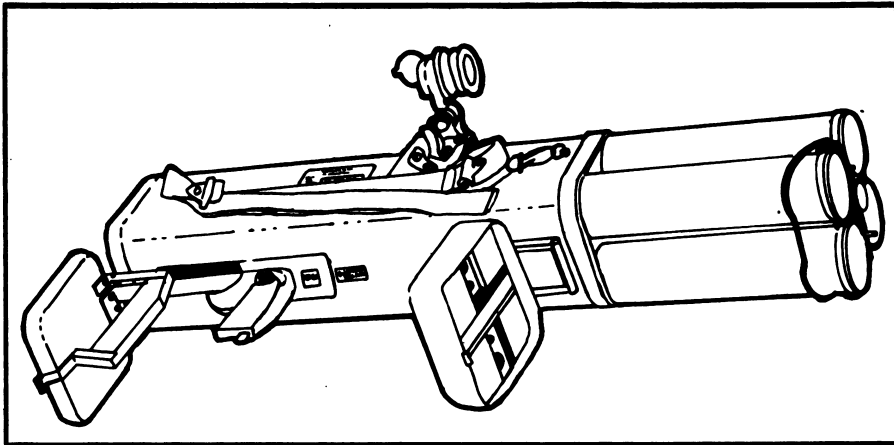


Figure 2

3. Place the launcher on the right shoulder (fig. 3).

a. Place the right hand under the launcher to support it.

b. Use the left hand to unlatch the front cover and rotate the handle outward until it stops.

(1) Holding the handle, rotate the front cover down below the launcher's tube until it locks into position. This action releases the trigger-handle assembly which is located beneath the launcher (fig. 2).

NOTE: If the trigger-handle assembly does not release, check to insure the front cover is in the fully locked position.

WARNING. DO NOT attempt to pull the trigger-handle assembly down if the front dust cover is not locked in the open position. To do so will prevent the dust cover from locking in the open position which will prevent the weapon from firing.

(2) Pull the trigger-handle assembly down. Insure that it is fully seated in the firing position and the safety switch is in the "SAFE" position.

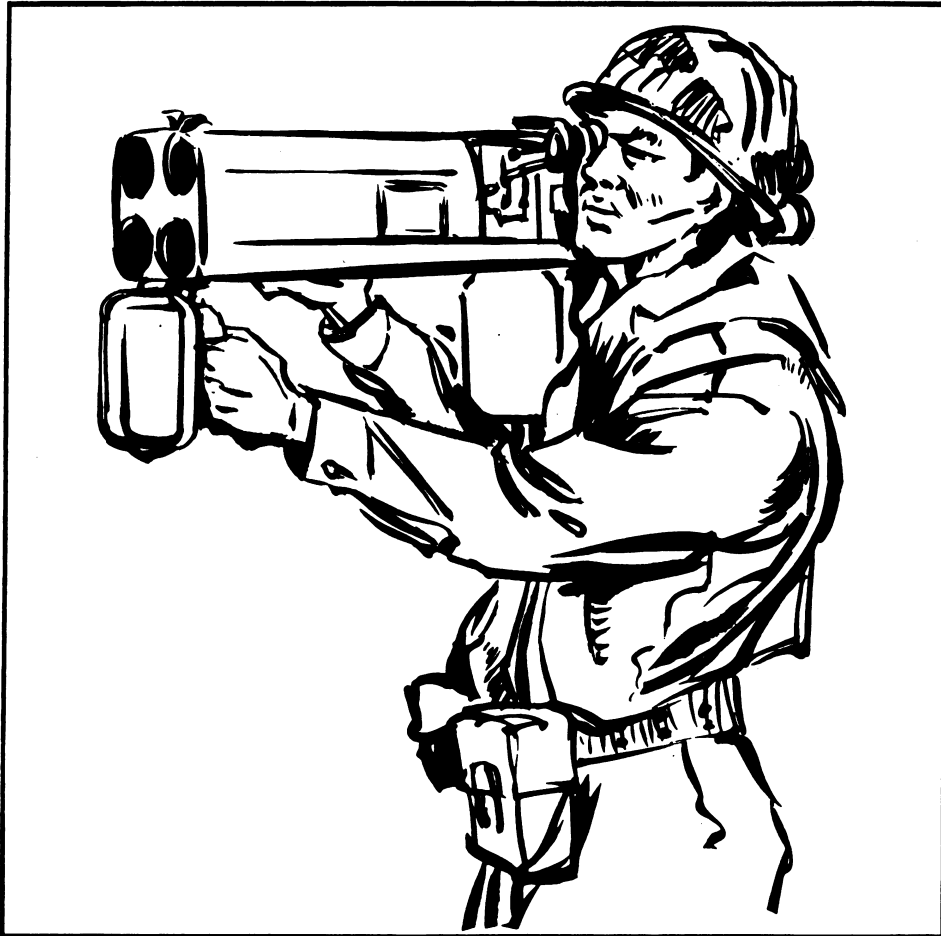


Figure 3

4. Check the backblast area (fig. 4).
5. Extend the sight by depressing the sight lock.
 - a. Move the sight to the rear detent position.
 - b. Raise the protective lens cover.

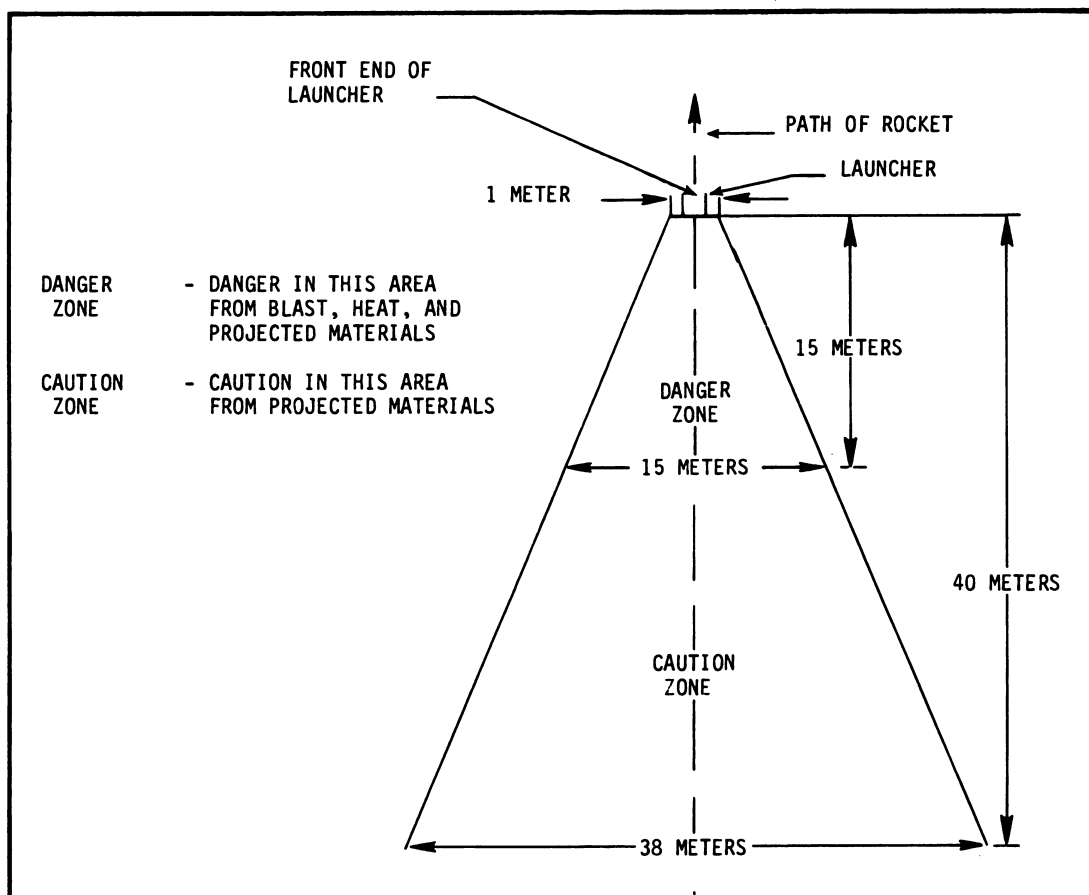


Figure 4

6. The launcher is now ready to fire (fig. 2).

7. To restore the rocket to carrying configuration. This step is performed if (1) there is a need to change location and all rockets have not been fired, (2) none of the rockets were fired.

a. With the rocket launcher still on your shoulder pointing down-range:

- (1) Place the trigger safety switch on "SAFE."
- (2) Reflecting sight assembly.
 - (a) Close the lens cover.
 - (b) Position the sight lock in forward detent.

(c) Fold the sight assembly in against the launcher.

(3) Press the trigger release button, unlocking the trigger-handle, and rotate it upward, engaging the interlock and releasing the front cover.

(4) Close and latch the front cover.

b. Remove the launcher from your shoulder.

c. Position it on the ground resting on the front cover.

d. Depress the clip lock button and push on the rear of the clip assembly, retracting the clip into the launcher.

e. Perform a visual and/or manual check of the clip latch, insuring that it is firmly engaged in the clip attachment slot of the rocket's firing pin mechanism assembly.

f. Close and latch the rear cover.

g. Adjust the sling and place it on your shoulder.

REFERENCE:

TC 23-2, 66mm Rocket Launcher M202A1, Apr 78 (chap 2, pages 2-7 thru 2-9, para 2-6a, thru 6c; page 2-19, para 2-13)

071-326-0512

ESTIMATE RANGE

CONDITIONS:

Given personnel, equipment, silhouettes, and/or vehicles, all stationary and either partially or fully exposed, at ranges from 50 to 3,000 meters, during daylight with good visibility.

STANDARDS:

State the actual range to each target with no more than a 20 percent error (plus or minus).

PERFORMANCE MEASURES:

1. General. The ability to estimate range is one of the most difficult skills for a combat soldier (infantry, armor, artillery) to learn, but it is also one of the most indispensable skills when needed. The four methods of estimating range discussed in this task are--

- a. Football-Field Method.
- b. Recognition/Appearance-of-Objects Method.
- c. Flash-to-Bang Method.
- d. Binocular-Reticle/Mil-Relation Method.

2. Football-Field Method. Even though the length of a football field is 100 yards instead of 100 meters, it is a unit of measure that most soldiers are familiar with and can be used in range estimation.

a. Become familiar with the appearance of 100-meter (football field) intervals on the ground (fig. 1).

b. For ranges up to 500 meters, estimate the number of football fields between you and the target.

c. For ranges between 500 and 1,000 meters, pick a point halfway between you and the target. Then determine the distance to the halfway point as described above. Double the estimate to find the range to the target (fig. 2).

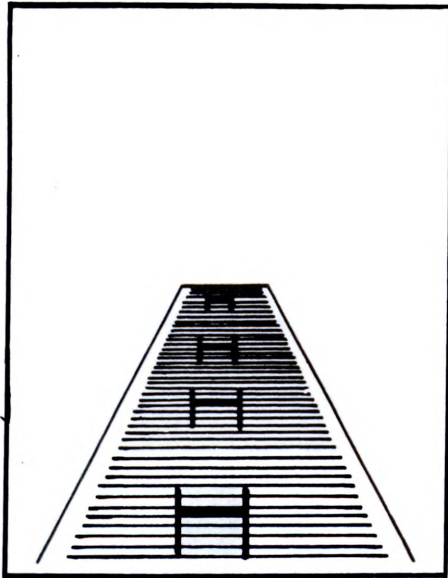
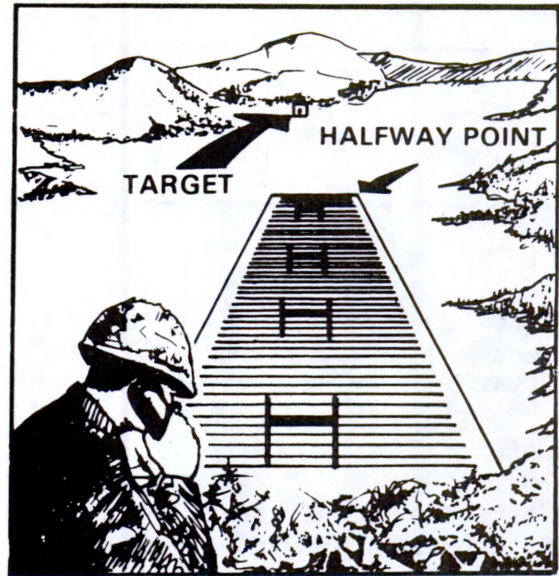


Figure 1



Example: Distance 700 meters
Figure 2

d. In using this method, learn the effects of terrain and weather conditions on target appearance, as shown in figure 3.

TARGET APPEARANCE

SEEMS CLOSER

- Bright clear day
- Sun in front of target
- Higher elevations
- Large targets
- Bright colors (white, red, yellow)
- Contrast
- Looking across ravines, hollows
rivers, depression
- At sea

SEEMS FARTHER

- Fog, rain, hazy twilight
- Sun behind target
- Lower elevations
- Small targets
- Dark colors
- Camouflaged targets

Figure 3

3. Recognition/Appearance-of-Objects Method.

a. Although the target conditions in figure 3 will have some effect on range estimation, the data in figure 4 will generally hold true. For example, in figure 4, with the naked eye you should be able to identify armored and wheeled vehicles from 1,500 to 2,000 meters. If you can positively identify the vehicle as a tank but cannot determine the model, it is between 1,000 and 1,500 meters. As shown in figure 4, binoculars greatly increase the range at which you can identify your target.

b. If possible, study the appearance of men and objects at various distances until you know how far away they are by how big or clear they seem to be.

RANGE DETERMINATION RECOGNITION METHOD		Naked Eye	Magnification
T A R G E T	Tank Crew Members, Troops, Machinegun, Mortar, Antitank Gun, Antitank Missile Launchers	500	2,000
	Tank, APC, Truck, <i>by Model</i>	1,000	4,000
	Tank, Howitzer, APC, Truck	1,500	5,000
	Armored Vehicle, Wheeled Vehicle	2,000	6,000
			M E T E R S

Figure 4

4. Flash-to-Bang Method.

a. In this technique, range is determined by measuring the time between the flash and the gun report (fig. 5).

b. Sound travels through the air at a fairly constant speed, about 300 meters per second. Comparatively, light travels in no time at all. Range can be determined if you can see and hear the action.

c. Observe the flash of the target/weapon firing.

d. Count the number of seconds until you hear the weapon fire. This time interval may be measured on a stopwatch, or by estimation, using a steady count such as, "ONE-THOUSAND-ONE, ONE-THOUSAND-TWO, ONE-THOUSAND-THREE," for a 3-second count. If you must count higher, than 10 seconds, start over at one.

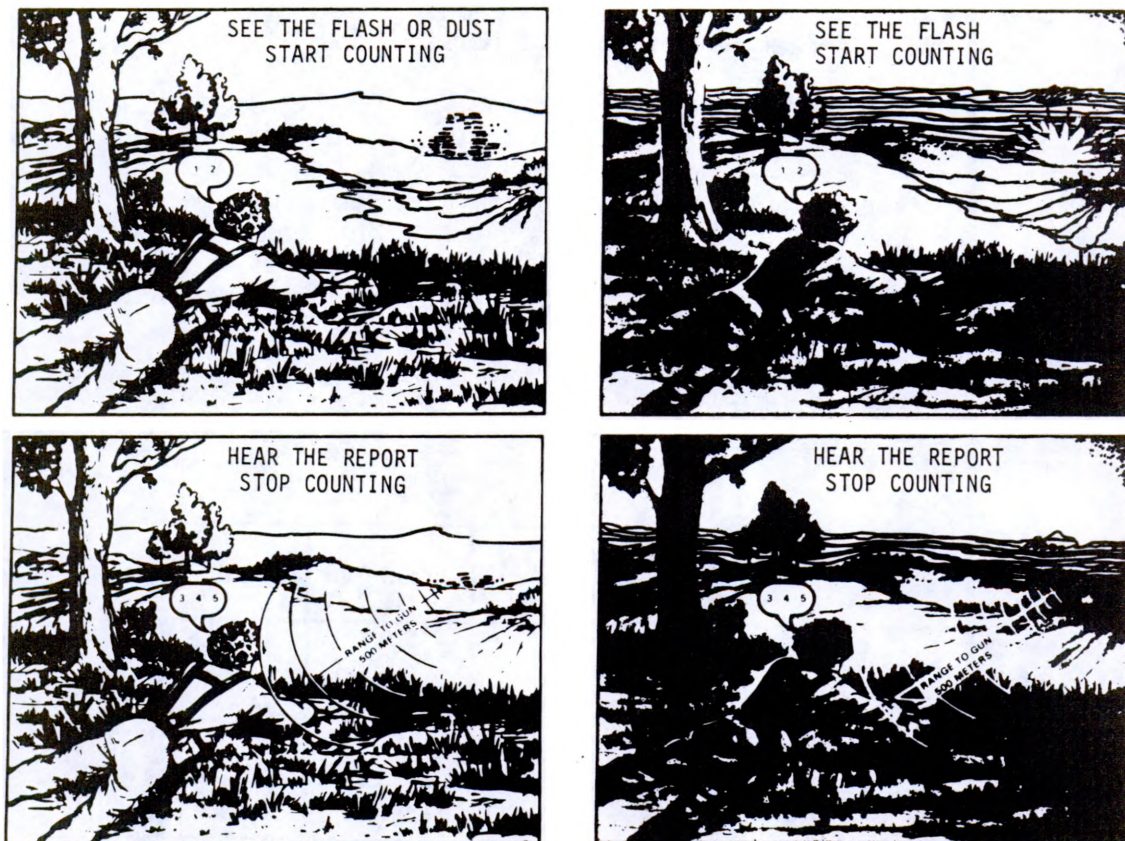


Figure 5

5. Binocular-Reticle/Mil-Relation Method.

a. The one drawback to the binocular-reticle/mil-relation method of range estimation is that you must know the width, length, or height of the target. For an explanation of the mil and meter relationship, see figure 6.

b. To determine the width, length, or height of the target in mils using your binocular reticle, see figure 8 and figure 9.

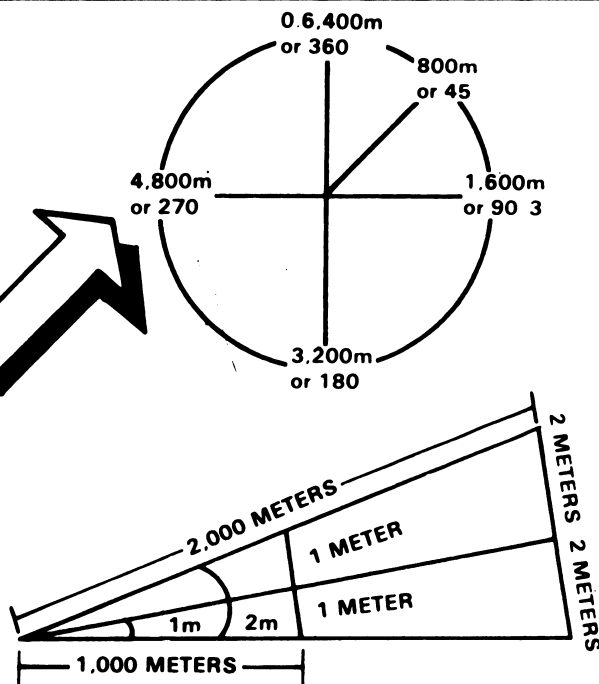
c. Using the known width, length, or height in meters and measured mil value, you can determine the range by using the formula $\frac{W}{R \times M}$ or to make it simpler $R = \frac{W}{M}$ (fig. 9). Figure 7 shows the computations for targets at various ranges.

Mil relation. The mil is a unit of angular measurement equal to $1/6,400$ of a circle. There are approximately 18 mils in 1 degree. One mil can be written $1m$. The mil is used because of the precise calculations and adjustment required. Fire control equipment is graduated in mils to conform to the mil method of measurement.

A COMPARISON OF MILS AND DEGREES

One mil equals width (or height) of 1 meter at a range of 1,000 meters.

This relation is constant as the angle increases from 1 mil to 2 mils and the range increases from 1,000 meters to 2,000 meters. Because the mil relation is constant, other units of measure such as yards, feet, or inches can be substituted for meters in expressing width or range; however, the relation holds true only if both W and R are expressed in the same unit of measure. For example, if the sides of a 1-mil angle are extended to 1,000 yards the width between the ends of the sides is 1 yard.



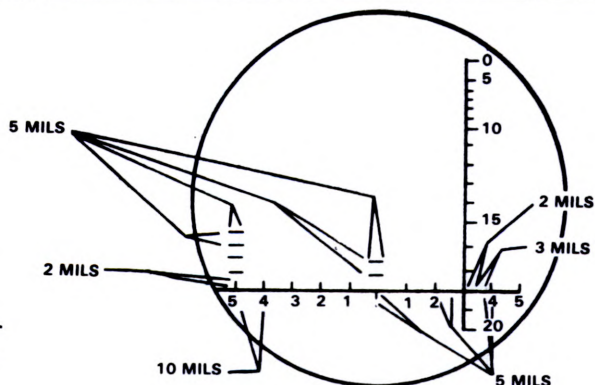
1 MIL AT 1,000 METERS EQUALS 1 METER.
 1 MIL AT 2,000 METERS EQUALS 2 METERS.
 2 MILS AT 1,000 METERS EQUALS 2 METERS.
 2 MILS AT 2,000 METERS EQUALS 4 METERS.

Figure 6

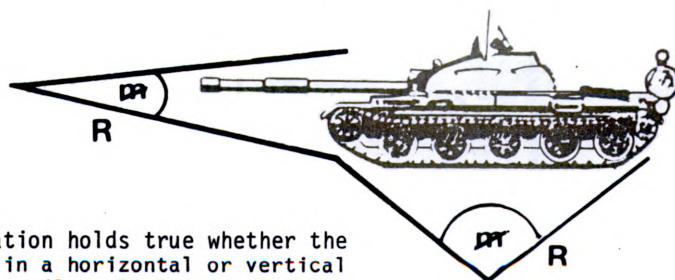
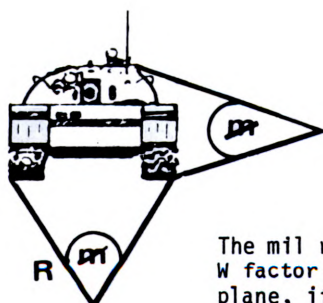
MIL ANGLE MEASUREMENT			1	2	3	4	5	5	7	8	9	10
Threat Medium Tank	Length: 6.5 meters	RANGE	6,500	3,300	2,200	1,600	1,300	1,100	900	800	700	700
	Width: 3.5 meters		3,500	1,800	1,200	900	700	600	500	400	400	400
Threat Heavy Tank	Length: 7.5 meters		7,500	3,800	2,500	1,900	1,500	1,300	1,100	900	800	800
	Width: 3.5 meters		3,500	1,800	1,200	900	700	600	500	400	400	400

Figure 7

DETERMINING RANGE USING THE MIL RELATION. Since the relationship of the angle in mils (m), the length of the sides in thousands (R), and the width between the ends of the sides (W) is constant, width of the target, range to the target, or mil value of the target can be determined if the other two are known.



BINOCULAR RETICLE



The mil relation holds true whether the W factor is in a horizontal or vertical plane, if the mil angle is measured in the same place.

As a memory aid use the word, "WORM."
WORM stands for:

Times

W idth in meters
O ver
R ange in thousands
M ils

$$\frac{W}{R \times m}$$

Figure 8

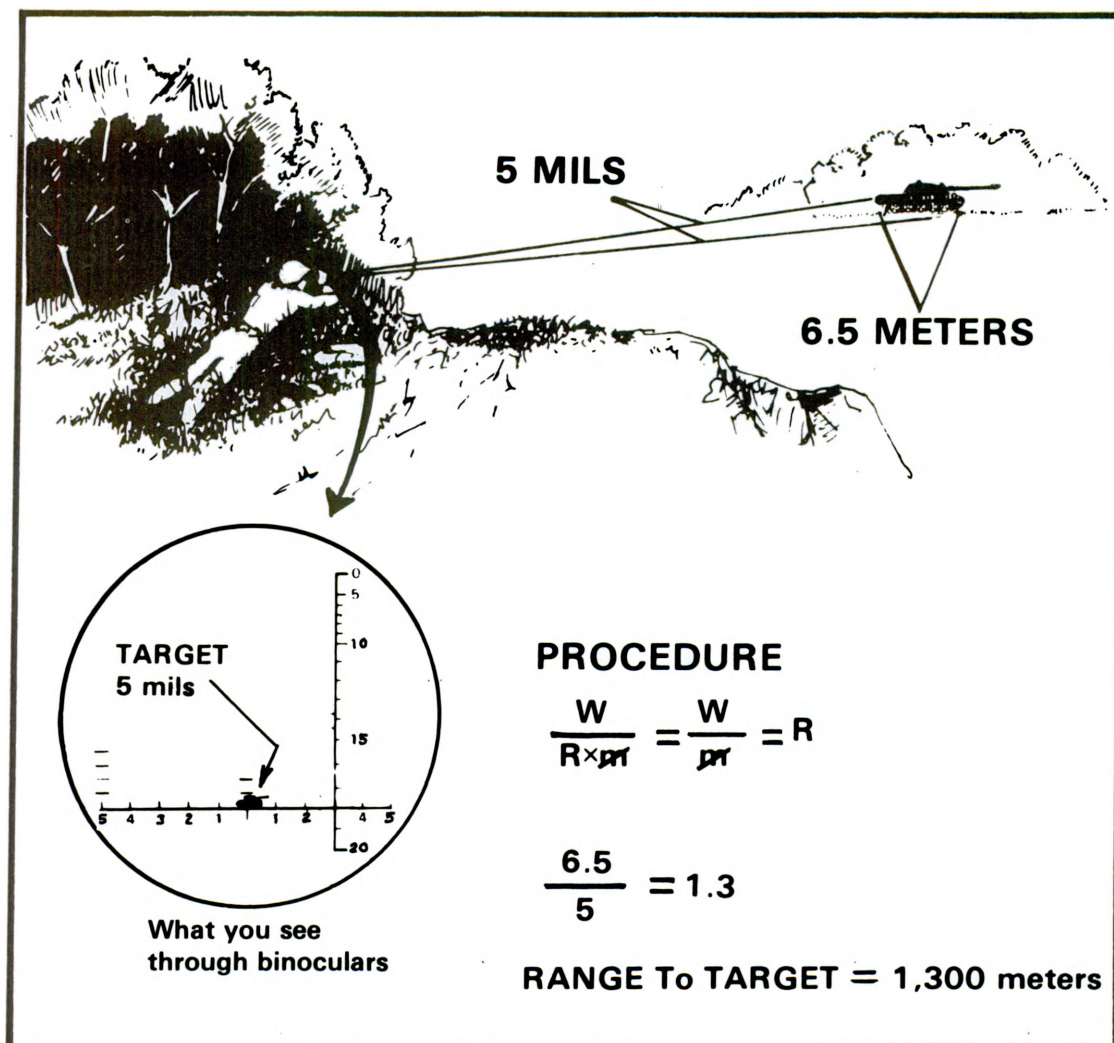


Figure 9

REFERENCES:

- FM 17-12, Tank Gunnery, Mar 77, (pages 7-2 thru 7-10)
 FM 21-75, Combat Training of the Individual Soldier and Patrolling, Jul 67, (page 12)
 TEC Lesson 020-171-1611-F, Target Range Determination
 TEC Lesson 020-171-1613-F, Use of Binocular Reticle and Worm Formula

071-335-0024

 ENGAGE TARGETS WITH THE M202A1 ROCKET LAUNCHER

CONDITIONS:

During daylight, on a suitable firing range, given an M202A1 rocket launcher loaded with four M74 incendiary rockets, a series of stationary targets located between 50 and 400 meters from the firer which will be presented in a combination of frontal, flank, or oblique views, instructions to engage targets until all rockets are expended, and targets consisting of:

<u>POSITION</u>	<u>NO. OF ROCKETS</u>	<u>TARGET</u>	<u>RANGE</u>
Prone or Fighting Position	*2	55-Gal Drum or	100 m
		Window (.75 m wide x 1 m high) or	100 m
		Bunker (1 m high x 1.5 m wide)	50 m
Kneeling or Standing	*2	10 E-Type Silhouettes	400 m

*If a first round hit is not obtained, use burst-on-burst for the second shot. If a first round hit is obtained, fire the remaining rocket(s) at:

Kneeling or Standing	1 or 2	Stationary Vehicle or 55-Gal Drum	200 m
-------------------------	--------	--------------------------------------	-------

STANDARDS:

Firer will:

1. Fire two rounds from a fighting or prone position.
2. Fire two rounds in the kneeling or standing position.

NOTE: Although specific targets are cited, the local availability of targets is a consideration. Therefore, any meaningful and realistic targets may be constructed or used. Targets should be placed at the ranges specified.

PERFORMANCE MEASURES:

1. Introduction to reflecting sight assembly (fig. 1).

a. Sight. The reflecting sight has a ladder-type reticle pattern (fig. 1a) with curved stadia lines on both sides of the vertical center line. Current sighting procedures do not require use of the stadia lines to obtain approximate target distance. The vertical rangeline is graduated in 100-meter increments from 0 to 500 meters from the top to the bottom of the sight reticle. On either side of the vertical rangeline are horizontal lead lines which aid the gunner in engaging moving targets.

b. Sight lock. The sight lock is a spring-loaded arm used to lock the sight in either the stowed or firing position.

c. Mounting plate. The mounting plate contains an elevation adjustment plate which has two notches for placing the sight in the stowed or firing position. Also, the plate allows adjustments to be made on the sight.

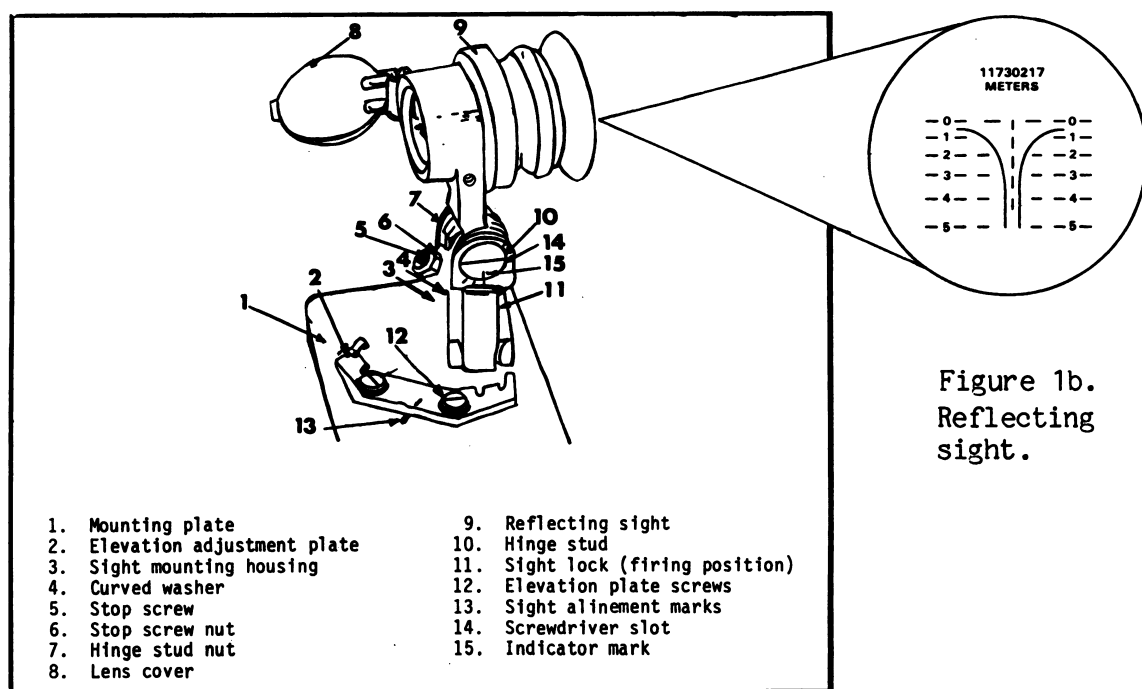


Figure 1b.
Reflecting
sight.

Figure 1a. Reflecting sight assembly.

2. Estimating Range. The first step in target engagement is to determine the range to the target. This should be done using visual range estimation (see task: Estimate Range) aided by the use of a range/sector card. A range/sector card is a rough drawing of the terrain in your defensive sector which shows easily recognized reference points (terrain features or objects) and the distance to each (paced off or measured when possible). If there are no usable reference points available, stakes can be erected at known ranges to serve the same purpose.

Range at which a 0.5 probability of an effective target hit can be expected (firing one rocket clip):

Bunker aperture.....	50 meters
Windows.....	125 meters
Uncovered weapons positions and stationary vehicles.....	200 meters
Squad-size troop formations.....	500 meters
Maximum range.....	750 meters
Minimum safe range.....	20 meters

3. Obtaining a correct sight picture.

a. Stationary targets. After determining the range, you sight on stationary targets by:

(1) Locating the range mark on the vertical range line corresponding to the estimated range.

(2) Placing that point on the center of target mass (fig. 2).

(3) Fire.

NOTE: Consider all front/rear views as stationary targets, even if the targets are moving.

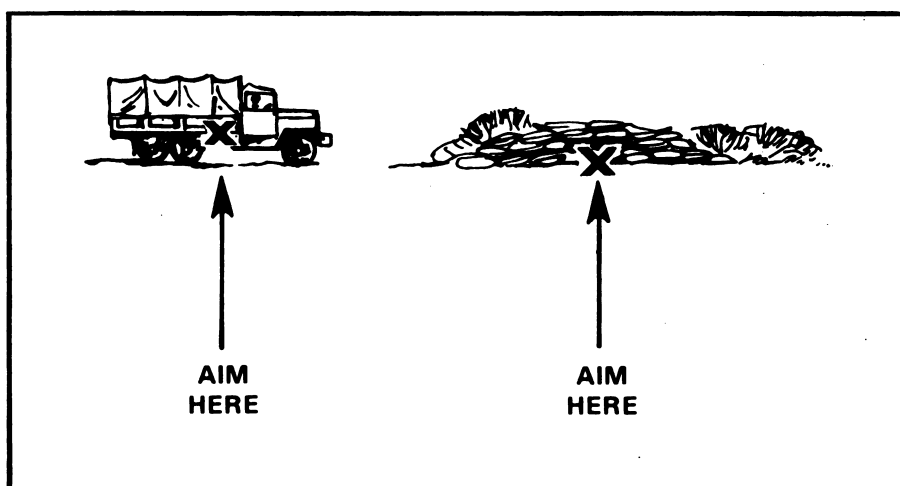


Figure 2. Aiming point for point-type stationary targets.

b. Area-type targets. When engaging area-type targets, the weapon which poses the greatest threat should be engaged first. When the "greatest" threat is eliminated or does not exist, engage the target at the center of the near half of the target (fig. 3).



Figure 3. Aiming point for area-type target.

c. Moving targets. After determining the range, you sight on moving targets by:

- (1) Estimating target speed as slow or fast (see table 1).
- (2) Applying lead. Each lead line or space represents 8 kmph (5 mph) of apparent speed.
- (3) Applying appropriate lead using lead line directly opposite estimated range.

ESTIMATE TARGET SPEED AS:

SLOW for:

- a. Vehicles moving 5 mph (8 kmph) or less.
- b. All oblique targets where you see more of the front/rear than side.

FAST for:

- All targets (except b above) traveling faster than 5 mph (8 kmph).

Table 1. Estimating target speed.

(a) For slow targets (flanking), lead line should be on the center of mass (fig. 4a). The vertical range line should be in front of the target.

(b) For slow targets (oblique). If more of the vehicle's side is visible than its front or rear, engage it as if it was a slow target (fig. 4b).

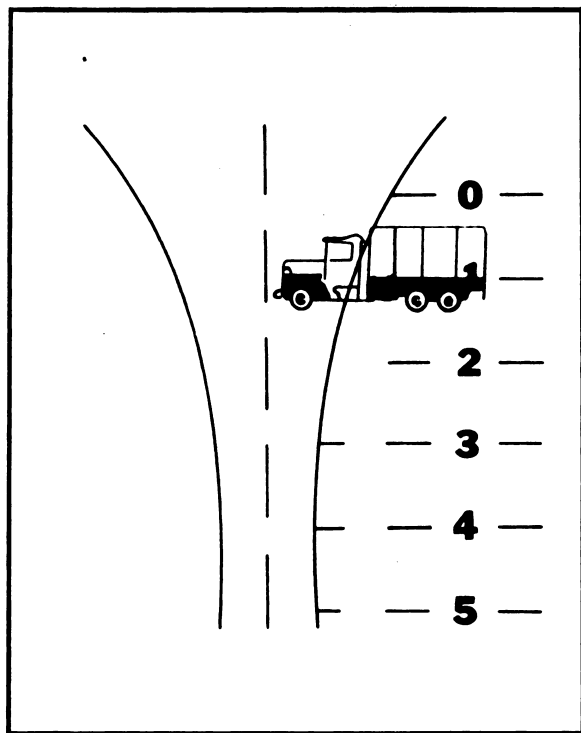


Figure 4a. Flanking.

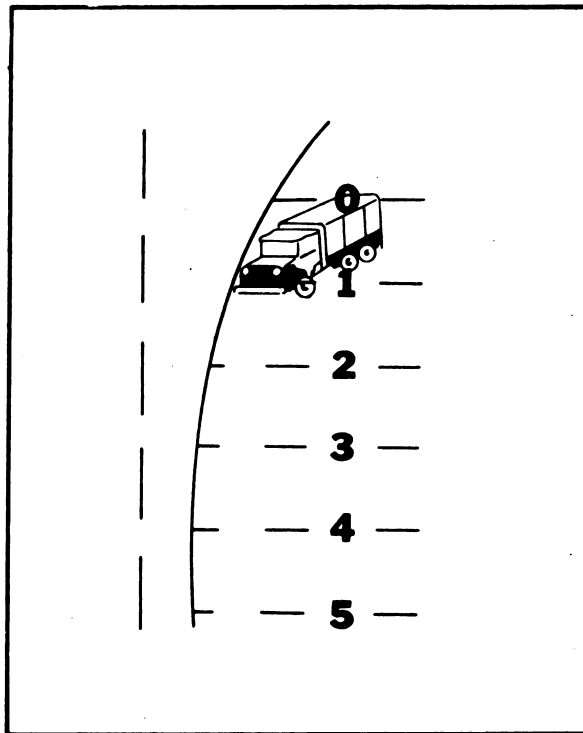


Figure 4b. Oblique.

Figure 4. Slow targets at an estimated range of 100 meters.

(c) For fast targets (flanking), lead line should be on front edge of target (fig. 5a). The vertical range line should be in front of the target.

(d) For fast targets (oblique), if more of the target front is visible, engage it as if it was a fast target (fig. 5b).

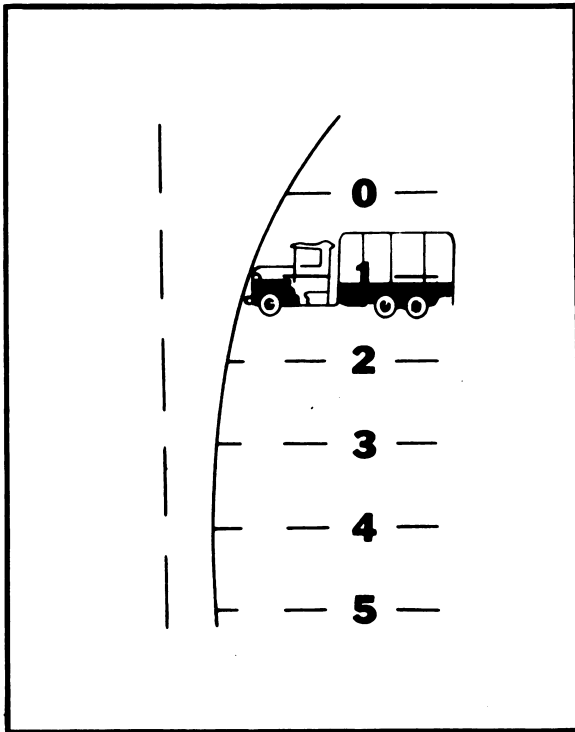


Figure 5a. Flanking.

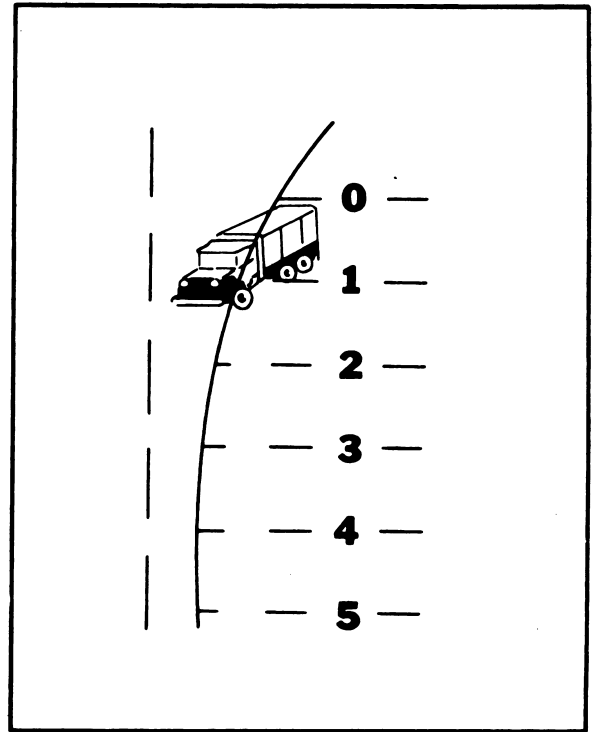


Figure 5b. Oblique.

Figure 5. Fast targets at an estimated range of 100 meters.

4. Special aiming technique (burst-on-target technique).

a. Targets at a range of 500 meters or less.

(1) After firing the weapon, hold your original sight picture until the rocket impacts.

(2) Note the point on the sight reticle where the round burst appears (figure 6a).

(3) Move this point onto the center of mass of the target (fig. 6b).

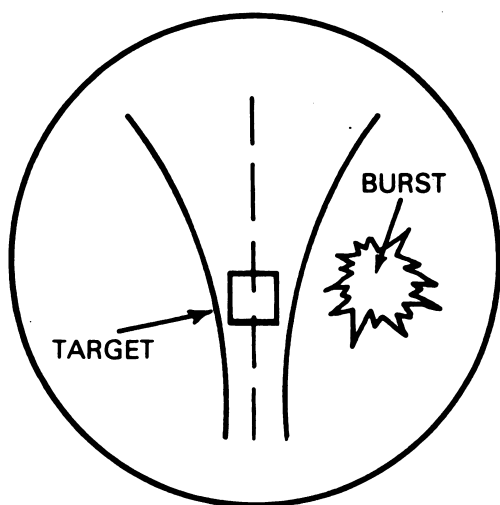


Figure 6a. Burst-on-target aiming technique.

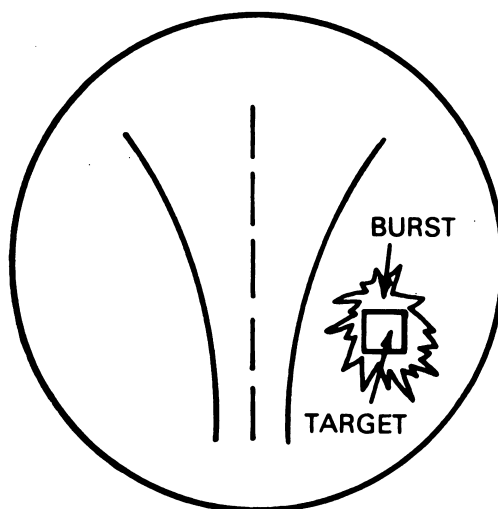


Figure 6b. Shifting center of mass of target.

(4) Fire again. This should give you a target hit; if not, apply the same principle (steps 4a (1)-(3)) and fire again. This time, you should have a target hit.

b. Targets at ranges beyond 500 meters.

(1) At ranges beyond 500 meters and out to 700 meters, the smoke and flame of the M202A1 rocket launcher can be used to suppress enemy troops in fortified positions or wooded areas.

(2) To sight on target areas beyond 500 meters, center the target in the bottom of the sight (figs. 7a and 7b).

(3) If you miss with your first round, observe the round burst on your sight and try to move that point onto the target (figs. 6a and 6b). Since the reticle is graduated only out to 500 meters, the burst may appear within the sight but not within the sight reticle itself.

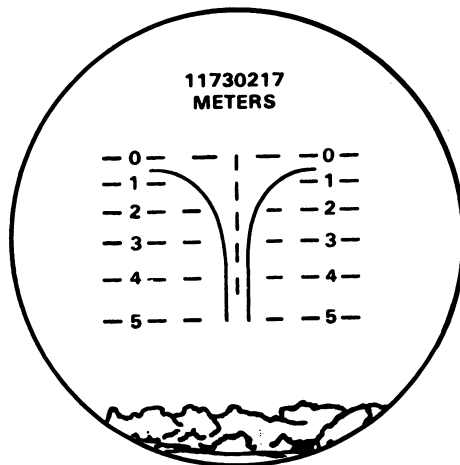
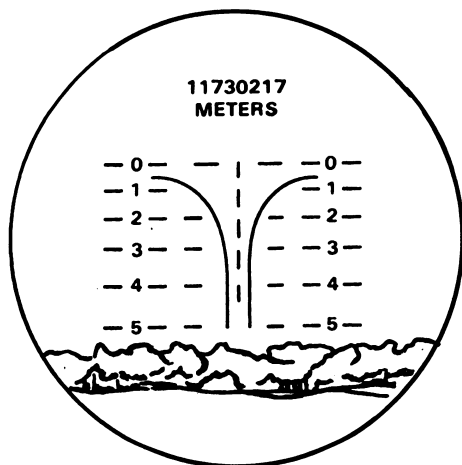


Figure 7a. Woodline at 600 meters. Figure 7b. Woodline at 700 meters.

5. Steady hold techniques. The gunner must hold the M202A1 steady while firing to obtain an accurate first round shot and to properly employ the burst-on-target technique. The following principles of steady hold should be applied.

- a. Whenever possible, fire from a supported position.
- b. Don't breathe during aiming and firing.
- c. Relax; muscle strain or tension causes trembling.
- d. Pull the trigger; don't jerk it. Jerking will pull the weapon off target.
- e. With the left hand, hold the weapon so that the rear dust cover rests snugly against the right shoulder.

6. Firing the launcher.

- a. Release the trigger safety by moving the switch to the rear.
- b. Using two fingers on the trigger and applying a smooth and steady rearward pressure, squeeze the trigger.

c. After each rocket has fired, relax your fingers to allow the trigger to return to the fully forward position.

d. This method must be repeated to fire each of the rockets. Only one rocket can be fired with each trigger squeeze.

REFERENCE:

TC 23-2, 66mm Rocket Launcher M202A1, Apr 78 (chap 2, pages 2-9 thru 2-18, para 2-7, 2-8, and 2-10)

FM 31-11C-S

071-335-0025

PERFORM MISFIRE/DESTRUCTION PROCEDURES
FOR THE M202A1 ROCKET LAUNCHER

CONDITIONS:

Given a loaded M202A1 rocket launcher, which fails to fire after the trigger is depressed.

STANDARDS:

1. Within 1 minute, perform misfire procedures in accordance with performance measures.

2. If the rocket fails to fire in a combat zone, destruction will be accomplished in accordance with performance measures.

PERFORMANCE MEASURES:

1. Misfire procedures in a combat zone.

a. Squeeze the trigger four times after the last misfired rocket. If this fires the rockets and empties the clip, remove the empty clip and conduct a function check before the rocket launcher is fired again.

b. If this does not empty the clip, place the trigger safety in the "SAFE" position. Keep the launcher pointed toward the enemy, lower it from your shoulder and place it on the ground, resting on the front and rear dust covers.

c. Grasp the side of one clip tube and remove the clip latch to separate the firing pin mechanism from the clip (fig. 1). If separation does not occur, carefully insert a knife blade between the firing pin mechanism and clip manifold and apply pressure to obtain at least a 1-inch separation between the two.

d. Depress the clip lock button, grasp either of the top two rocket tubes, and remove the clip (fig. 2).

CAUTION. Failure to depress the clip lock button will damage the launcher.

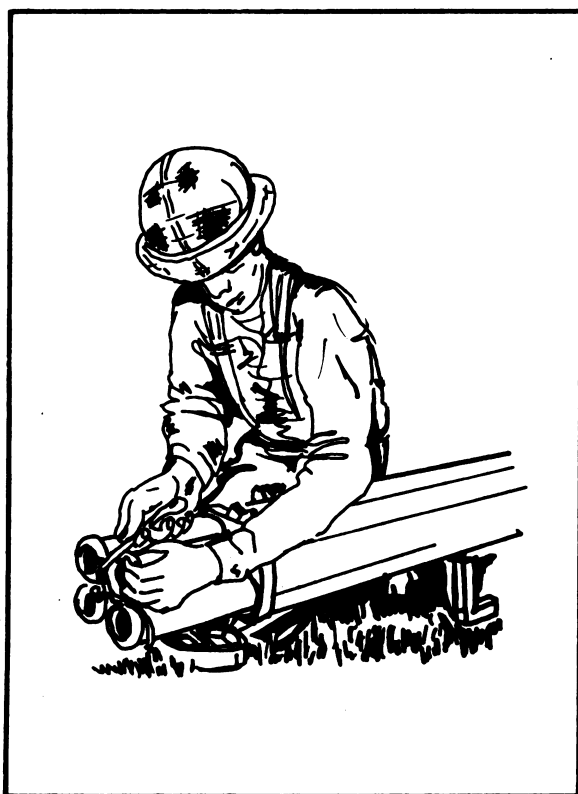


Figure 1



Figure 2

e. Place the rocket clip on the ground a minimum of 60 meters from your position and friendly troops.

f. Inspect the launcher prior to reloading.

2. Misfire procedures in a training environment.

a. Shout "MISFIRE" to warn all personnel that you have a misfire. Keep the launcher pointed at the target.

b. Squeeze the trigger four times after the last misfired rocket. If this fires the rockets and empties the clip, remove the empty clip and conduct a function check before the rocket launcher is fired again.

c. If this does not empty the clip, place the trigger safety in the "SAFE" position. Keep the launcher on your shoulder and pointed downrange for 1 minute.

d. Keeping the launcher pointed downrange, lower it from your shoulder and place it on the ground, resting on the front and rear dust covers.

e. Grasp the side of one clip tube and remove the clip latch to separate the firing pin mechanism from the clip. If separation does not occur, carefully insert a knife blade between the firing pin mechanism and clip manifold and apply pressure to obtain at least a 1-inch separation between the two.

f. Depress the clip lock button, grasp either of the two top rocket tubes, and remove the clip.

CAUTION. Failure to depress the clip lock button will damage the launcher.

g. Inspect the launcher prior to reloading.

3. Destruction of rocket clip (combat zone).

a. Authorization. Destruction of the rocket launcher and/or rocket clip to prevent capture and/or abandonment in a combat zone must be authorized by the unit commander.

b. Procedures.

(1) The rocket launcher can be destroyed by striking the launcher tubes, firing mechanism, and sight with an ax. The launcher can be run over by a vehicle, or in extreme emergencies, destroyed by firing rifle or pistol rounds through the launch tubes, firing mechanisms, and sight.

(2) The rockets can be destroyed by exploding them with demolitions 800 meters from friendly troops. When that is not possible, place the rockets in an unoccupied foxhole and detonate them with a hand grenade. All personnel within 750 meters of this site should be in covered positions.

c. Priority. If unable to destroy the rocket launcher and the rocket clip at the same time, priority of destruction is given to the rocket launcher.

4. Destruction of the rocket clip (training). Report the need for destruction to your supervisor.

FM 31-11C-S

REFERENCE:

TC 23-2, 60mm Rocket Launcher M202A1, Apr 78 (chap 2, sec III, pages 2-21 and 2-22; chap 3, page 3-4)

071-335-0026

CONSTRUCT A FIELD EXPEDIENT AIMING DEVICE

CONDITIONS:

Given an M202A1 in a defensive position, six sticks (2 to 3 feet long) or similar materials available in the area, rope, string or wire to tie the sticks together, and instructions on the individual's preplanned sector of fire for use during periods of limited visibility.

STANDARDS:

Within 6 minutes construct a field expedient aiming device to cover probable enemy avenues of approach and assault positions, indicating individual's preplanned sector of fire limits so (when the weapon is employed using the device), the rockets--

1. Can be placed in selected target areas or positions.
2. Are all within the sector of fire.

PERFORMANCE MEASURES:

1. Place the rear stakes first.
 - a. Drive stakes 6 inches into solid ground, far enough apart so the launcher can fit between them.
 - b. Lash the crossmember to the target side of the rear stakes. The crossmember should be level and more than 12 inches above ground level.
2. Position the front right stake.
 - a. Insure the stake is flush against the right side of the launcher and between the front dust cover and trigger mechanism.
 - b. Add the left front and the crossmember. Crossmember must be at the proper height (fig. 1).

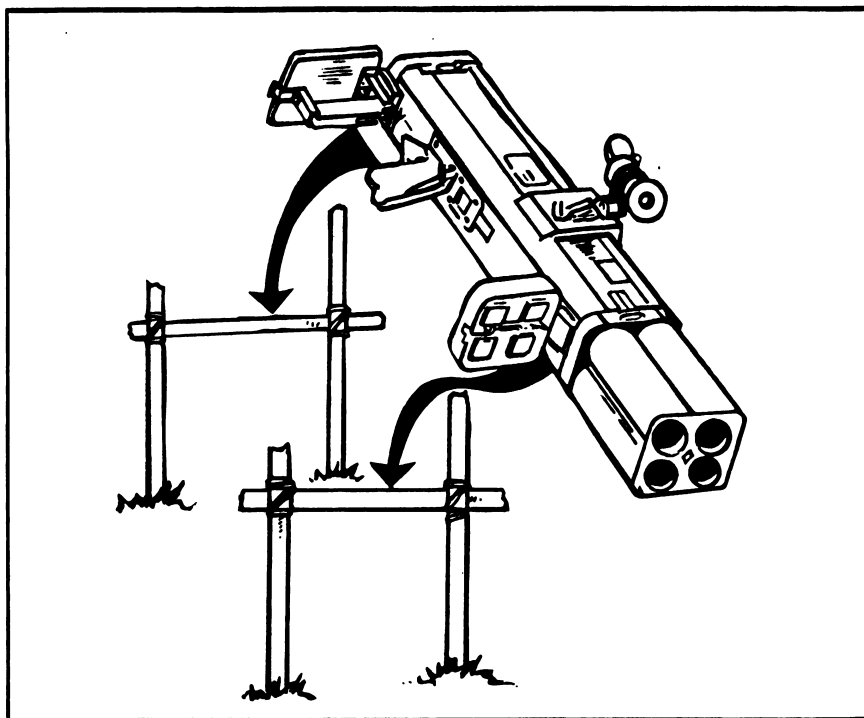


Figure 1

NOTE: To obtain proper height, have an assistant mark it while the gunner is aiming.

3. When aiming, the bridge on the rear dust cover should rest on the rear crossmember with the dust cover itself flush against the crossmember.

4. When firing, push the weapon up against the right posts and squeeze the trigger.

REFERENCE:

TC 23-2, 66mm Rocket Launcher M202A1, Apr 78 (chap 4, pages 4-14 and 4-15, para 4-7d(1) thru d(4))

071-335-0028

PREPARE A RANGE CARD FOR AN M202A1

CONDITIONS:

In a field environment, given an M202A1, a fighting position (designated as primary, alternate, or supplementary), a sector of fire, target reference points and probable target engagement areas, pencil and paper, and lensatic compass.

STANDARDS:

Within 10 minutes, prepare a range card for an M202A1 that illustrates a representative sketch of the terrain and includes, as a minimum:

1. Weapon position indicated by the proper weapon symbol (⚡ M202A1).
2. Distance and azimuth plotted from a known point to the weapon position.
3. Assigned sector of fire showing complete boundaries.
4. Maximum engagement line.
5. Deadspace within the sector of fire.
6. Azimuth and range to target reference points (TRP) and/or anticipated target engagement areas.
7. Magnetic north arrow (properly oriented).
8. Probable target areas covered by field expedient aiming methods.
9. Marginal information.
 - a. Firing position designation (primary, alternate, or supplementary).
 - b. Unit designation (no higher than company).
 - c. Date/time group.

TRAINING NOTES:

1. A range card is a sketch of the terrain that a weapon has been assigned to cover by fire. It contains information which assists in the planning and controlling of fire, in the rapid detection and engagement of targets, and in the orientation of replacement personnel or units. By using a range card, you can quickly and accurately determine the information you need to engage targets.

2. Sectors of Fire. A sector of fire is a portion of the battlefield where you are responsible for engaging targets with your weapon. A sector of fire can be of any shape or size. Leaders assign sectors of fire to insure that no matter where a target appears, there will be a weapon positioned to engage it. The following terms are used in conjunction with sectors of fire.

a. Anticipated Target Engagement Areas. Your leader may also designate anticipated target engagement locations within your sector of fire. These are recognizable terrain features on or near likely enemy avenues of approach.

b. Target Reference Points (TRP). TRPs are natural or manmade terrain features which can be used as reference points for locating targets and controlling direct fires. TRPs are designated by a specific letter or number (or a combination). If there are TRPs in or near your sector of fire, your leader will point them out and tell you the designation. If he does, they are shown on your range card.

c. Deadspace. Deadspace is an area or areas where direct fire weapons cannot hit. The area behind buildings, hills, or woods, for example, is deadspace. All deadspace in your sector(s) of fire must be determined because your leaders need to plan other types of fire (mortars, artillery, mines) to cover the area. Deadspace is indicated on your range card by a series of parallel lines, or the word "DEADSPACE" (fig. 1).

d. Maximum Engagement Line. The maximum engagement line is a line beyond which a target cannot be engaged. This line may be closer than the maximum effective range of the weapon. Both the terrain and the maximum engagement range of your weapon determine the path of the maximum engagement line.

3. After your leader shows you where to position your launcher, he will indicate your sector of fire by pointing out that portion of the terrain for which you are responsible. He will do this by giving you boundaries located between prominent terrain features, or by left and right limits indicated by terrain features or azimuths. If necessary, he may also assign you more than one sector of fire and will designate one as primary and the other as secondary.

PERFORMANCE MEASURES:

Preparation of the range card is based on the following considerations and procedures.

a. Once your leader has given you the necessary information, you can begin preparing your range card, depending upon the priority of other jobs you must perform, such as preparing and camouflaging your firing position. If you are assigned alternate and supplementary firing positions, a range card is required for them also.

b. Procedure:

(1) In the lower center of your range card, indicate your firing position by drawing the symbol of your weapon. Then draw and label your sector sketch. Draw roads, bridges, buildings, streams, hills, woods. Be as accurate as you can.

(2) Show the location of your firing position by drawing an arrow from a nearby recognizable terrain feature to the weapon symbol. Label the recognizable terrain feature and add the distance and azimuth from the terrain feature to your firing position.

(3) Now draw in your sector. This is a line that encloses your sector of fire. The maximum engagement line is a segment of the sector line and indicates the maximum range for target engagement.

(4) Draw in your sector deadspaces. Indicate by an enclosed line, containing parallel lines, those areas you cannot hit. You can also write the word "DEADSPACE."

(5) Orient the range card with the terrain and determine the direction of magnetic north with a compass. Draw a magnetic north arrow properly oriented. Draw the TRPs in your sector and label them. Then draw in the ranges and azimuths to the TRPs. If any anticipated target engagement locations are given, draw in the range and azimuth to them.

(6) Draw in probable target areas covered by field expedient aiming methods.

(7) In a corner of your range card, place the following marginal data which is used by leaders to identify range cards.

(a) Type position (primary, alternate, supplementary).

(b) Unit description. (Never indicate your unit higher than your company. The enemy will not be able to learn important military information if they find your range card.)

TRP	RANGE	DISCRIPTION	REMARKS
A	500	BRIDGE	Fire with Final Protection Fires
B	200	BARN	Field Expedient
C	450	TOWER	Watch MG Fire
D	350	R.J.	Field Expedient
E	300	HOUSE	
F	500	WOODS	(E and F Secondary Sector)

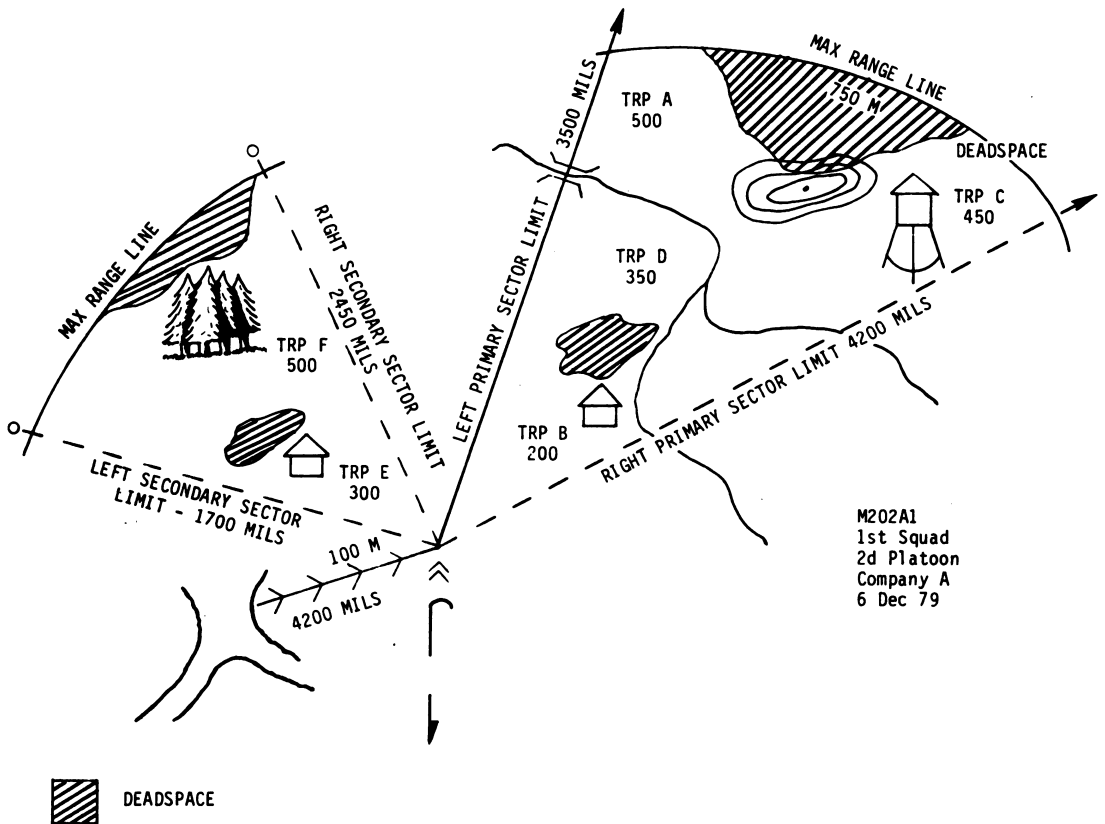


Figure 1

(c) Date/time group (the actual time you completed the range card).

(8) Your range card is now finished. The range card you construct for your sector of fire may not look the same as the one in this task. However, the basic information and method of construction presented in this task is the same when preparing an M202A1 range card (fig. 1).

(9) Make two copies of each range card prepared. Keep one copy at your firing position. The second copy will normally be picked up by your squad or section leader for preparation of fire plans and coordination of fires.

NOTE: This range card does not allow fire to the front; however, this area will be engaged by other infantry fighting positions to the flank. This card also illustrates that the firer will be firing the launcher by sitting on the back edge of the position, firing over the front berm, kneeling behind an adjacent berm, or from a special berm constructed for the weapon. Should the firer have to fire from the fighting position, the maximum engagement line would be considerably less than the maximum range line, generally no more than 200 meters from the position.

REFERENCES:

None

CHAPTER 4

CONVENTIONAL 11C TASKS CRITICAL TO
11C-S DUTY POSITIONS

You are responsible for the material found in FM 7-11C for your skill level, and the material in this manual. The following tasks from the FM 7-11C Soldier's Manual have been identified as especially critical for the 11C-S. You should be proficient in these tasks regardless of your skill level and the level at which they are found.

<u>TASK NUMBER</u>		<u>FROM</u>
	<u>FORWARD OBSERVER PROCEDURES</u>	FM 7-11C
		<u>SL</u> <u>PAGE</u>
071-329-1021	Determine Enemy Target Location Using Grid Coordinates	2 2-IV-A-4.1
	<u>COMPUTING</u>	
071-321-1601	Prepare the M16 Plotting Board for Operation as an Observed Chart and Determine Initial Firing Data for Mortars (Pivot Point)	2 2-V-A-1.1
071-321-1602	Process Subsequent FO Corrections Using M16 Plotting Board (Pivot Point)	2 2-V-A-2.1
	<u>M203 GRENADE LAUNCHER</u>	
071-311-2101	Perform Operator Maintenance on M203 Grenade Launcher and Ammunition	1 2-III-B-2.1
071-311-2102	Load, Unload, and Clear the M203 Grenade Launcher	1 2-III-B-2.1
071-311-2103	Zero an M203 Grenade Launcher	1 2-III-B-3.1
071-311-2104	Engage Targets With an M203 Grenade Launcher and Apply Immediate Action to Reduce a Stoppage	1 2-III-B-4.1
071-311-2105	Use Limited Visibility Firing Technique With The M203 Grenade Launcher	1 2-III-B-5.1

TASK NUMBERSLPAGELIGHT ANTITANK WEAPON (LAW)

071-318-2201	Prepare an M72A2 LAW for Firing; Restore M72A2 LAW to Carrying Configuration	1	2-III-C-1.1
071-318-2202	Engage Targets With an M72A2 LAW	1	2-III-C-2.1
071-318-2203	Apply Immediate Action to Correct a Malfunction on an M72A2 LAW	1	2-III-C-3.1

FROM

FM 7-11B

106MM RECOILLESS RIFLE

071-319-3601	Perform Operator Maintenance on a Caliber .50 Spotting Rifle, M8C	1	2-III-I-1.1
071-319-3602	Load, Reduce a Stoppage, Unload, Clear the Caliber .50 Spotting Rifle, M8C	1	2-III-I-2.1
071-319-3603	Perform Operator Maintenance on a 106mm RCLR	1	2-III-I-3.1
071-319-3604	Load, Reduce a Stoppage, Unload, the 106mm RCLR	1	2-III-I-4.1
071-319-3605	Engage Targets with the 106mm RCLR	1	2-III-I-5.1
071-319-3606	Conduct 106mm RCLR Weapon System Alinement	1	2-III-I-6.1

FROM

FM 7-11C

81MM MORTAR

071-321-3901	Place a Ground-Mounted 81mm Mortar Into Action	1	2-VIII-A-1.1
071-321-3902	Boresight 81mm Mortar	1	2-VIII-A-2.1
071-321-3903	Perform Safety Checks on 81mm Mortar (Ground-or Carrier-Mounted)	1	2-VIII-A-3.1

<u>TASK NUMBER</u>		<u>SL</u>	<u>PAGE</u>
071-321-3904	Lay Mortar for Deflection and Elevation (D&E) (Ground-/Carrier-Mounted)	1	2-VIII-A-4.1
071-321-3905	Prepare 81mm Mortar Ammunition for Firing	1	2-VIII-A-5.1
071-321-3906	Perform Operator's Maintenance on 81mm Mortar and Associated Fire Control Equipment	1	2-VIII-A-6.1
071-321-3907	Remove a Misfire From the 81mm Mortar (Ground-Mounted)	1	2-VIII-A-7.1
071-321-3909	Refer Sight and Realine Aiming Post	1	2-VIII-A-8.1
071-321-3910	Reciprocally Lay Mortar Using M2 Aiming Circle and Place Out Aiming Posts	1	2-VIII-A-9.1
071-321-3911	Manipulate Mortar for Traversing and Searching Fires	1	2-VIII-A-10.1
071-321-4053	Fire a Ladder Mission Using Fire Without an FDC (Direct Alinement)	2	2-VIII-F-4.1
071-321-4054	Fire a Traversing Mission Using Fire Without an FDC	2	2-VIII-F-5.1
071-321-4055	Engage a Deep Target Using Searching Fire Without an FDC	2	2-VIII-F-6.1
071-321-1601	Prepare The M16 Plotting Board for Operation as an Observed Chart and Determine Initial Firing Data for Mortars (Pivot Point)	2	2-V-A-1.1
071-321-1602	Process Subsequent FO Corrections Using M16 Plotting Board (Pivot Point)	2	2-4-A-2.1
071-321-1603	Prepare M16 Plotting Board for Operation as an Observed Chart (Below Pivot Point) and Modified Observed Chart	2	2-V-A-3.1

<u>TASK NUMBER</u>		<u>SL</u>	<u>PAGE</u>
071-321-1604	Process Subsequent FO Corrections Using M16 Plotting Board as a Modified Observed Chart	2	2-V-A-4.1
071-321-1605	Determine Data for Sheaf Adjustments	2	2-V-A-5.1
071-321-1606	Determine Data from Reregistration and Application of Corrections	2	2-V-A-6.1
071-321-1607	Record Information on Firing Data Sheet (81mm)	2	2-V-A-7.1
071-321-1620	Determine Firing Corrections	2	2-V-A-8.1
071-321-1621	Record Meteorological (MET) Data Using MET Data Sheet (81mm Mortar)	2	2-V-A-9.1
071-321-1622	Determine and Apply MET Firing Corrections (81mm Mortar)	2	2-V-A-0.1
071-321-1623	Prepare FDC Order	3	2-V-A-11.1
<u>107MM MORTAR</u>			
071-322-4201	Ground Mount 107mm (4.2-in) Mortar	1	2-VIII-C-1.1
071-322-4202	Boresight 107mm (4.2-in) Mortar	1	2-VIII-C-2.1
071-322-4203	Perform Safety Checks on 107mm (4.2-in) Mortar (Ground- and Carrier-Mounted)	1	2-VIII-C-3.1
071-322-4204	Lay Mortar for Deflection and Elevation (D&E) (Ground-/Carrier Mounted)	1	2-VIII-C-4.1
071-322-4205	Prepare 107mm (4.2-in) Mortar Ammunition for Firing	1	2-VIII-C-5.1
071-322-4206	Perform Operator Maintenance on 107mm (4.2 in) Mortar and Equipment	1	2-VIII-C-6.1
071-322-4207	Remove a Misfire From the 107mm (4.2-in) Mortar (Ground-Mounted)	1	2-VIII-C-7.1

<u>TASK NUMBER</u>		<u>SL</u>	<u>PAGE</u>
071-322-4208	Refer Sight and Realine Aiming Posts	1	2-VIII-C-8.1
071-322-4209	Reciprocally Lay Mortar Using M2 Aiming Circle and Place Out Aiming Posts	1	2-VIII-C-9.1
071-322-4210	Manipulate Mortar for Traversing Fire (Ground- or Carrier-Mounted)	1	2-VIII-C-10.1
071-322-1608	Prepare a Firing Chart for Operation and Determine Initial Firing Data	2	2-V-B-1.1
071-322-1609	Process Subsequent FO Corrections Using Firing Chart	2	2-V-B-2.1
071-322-1610	Determine Data for Sheaf Adjustment	2	2-V-B-3.1
071-322-1611	Determine Data from Reregistration and Application of Corrections to FDC Equipment	2	2-V-B-4.1
071-322-1612	Record Information on Firing Data Sheet (107mm (4.2-in)	2	2-V-B-5.1
071-322-1613	Record Meteorological (MET) Data Using MET Data Sheet (107mm Mortar)	2	2-V-B-6.1
071-322-1615	Determine and Apply MET for Corrections	2	2-V-B-7.1
071-322-1616	Apply Registration Corrections to the Fire Control Equipment for the 107mm Mortar	2	2-V-B-8.1
071-322-1617	Determine Data for 107mm (4.2-in) Mortar Using the M16 Plotting Board and GFS	2	2-V-B-9.1
071-322-1614	Prepare FDC Order	3	2-V-B-10.1

TACTICS

071-326-5551	Select Mortar/Weapons Platoon Positions (Primary, Alternate, and Supplementary)	4	2-X-A-1.1
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<u>TASK NUMBER</u>		<u>SL</u>	<u>PAGE</u>
071-326-5552	Prepare and Issue an Oral Operation Order	4	2-X-A-2.1
071-326-5553	Assist in Planning/Identifying Missions for Mortar Platoon/Section	4	2-X-A-3.1
071-326-5554	Direct Displacement of Mortar Platoon	4	2-X-A-4.1
071-326-5555	Select Movement Routes for Mortar/ Weapons Platoon	4	2-X-A-5.1
071-326-5556	Establish Security for Mortar/ Weapons Platoon Position	4	2-X-A-6.1

APPENDIX A

REFERENCES

NOTE: All references containing information on the subjects listed in this Commander's Manual may not be listed here. New material is constantly being published, and present references may become obsolete. See the DA Pam 310 series and instructional material catalogs to keep up to date.

DEPARTMENT OF DEFENSE (DOD) REGULATIONS

5200.1-R	Department of Defense Information Security Program
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380-5	Department of the Army Information Security Program
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5-20	Camouflage
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5-34	Engineer Field Data
6-20	Fire Support in Combined Arms Operations
6-30	The Field Artillery Observer
7-7	The Mechanized Infantry Platoon and Squad
7-10	The Rifle Company, Platoon, and Squad
7-11C1/2	Soldier's Manual, 11C10 and 11C20, Indirect Fire Infantryman
7-11C3	Soldier's Manual, 11C30, Indirect Fire Infantryman
7-11C4	Soldier's Manual, 11C40, Indirect Fire Infantryman
17-12	Tank Gunnery
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21-11	First Aid for Soldiers
21-26	Map Reading
21-30	Military Symbols
21-40	NBC Defense
21-41	Individual NBC Defense
21-50	Ranger Training and Ranger Operations

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21-60	Visual Signals
21-75	Combat Training of the Individual Soldier and Patrolling
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23-31	40mm Grenade Launchers M203 and M79
23-33	66mm Heat Rocket, M72A1, M72AE1, and M72
23-82	106mm Recoilless Rifle M40A2
23-85	60mm Mortar, M19
23-90	81mm Mortar
23-91	Mortar Gunnery
23-92	4.2-Inch Mortar, M30
24-1	Combat Communications
24-18	Field Radio Techniques
30-5	Combat Intelligence
31-35	Jungle Operations
31-70	Basic Cold Weather Manual
57-38	Pathfinder Operations
71-1	The Tank and Mechanized Infantry Company Team

TECHNICAL MANUALS (TM)

3-220	Chemical, Biological, and Radiological (CBR) Decontamination
3-4230-204-12&P	Operator's and Organizational Maintenance Manual for Decontaminating Apparatus, Portable, DS2, 1 1/2 Quart ABC-M11
5-6350-249-12	Operator and Organizational Maintenance Manual including Repair Parts and Special Tool Lists: Alarm Set, Anti-Intrusion; Restricted Area, AN/GSQ-151
9-1000-205-12	Operator's and Organizational Maintenance Manual: Recoilless Rifle, 106mm
9-1010-221-10	Operator's Manual for 40mm Grenade Launcher, M203
9-1015-200-12	Operator and Organizational Maintenance Manual: 81mm Mortar
9-1015-215-12	Operator and Organizational Maintenance Manual: Mortar, 4.2-Inch

TECHNICAL MANUALS (cont)

9-1015-223-12	Operator and Organizational Maintenance Manual: Rifle, Recoilless, 90mm
9-1310-202-12	Operator and Organizational Maintenance Manual Cartridges 40mm HE M386, M441 and M397
9-1345-203-12&P	Land Mines
9-1425-484-10	Operator's Manual for Dragon Weapon System, M47
9-2300-257-10	Operator's Manual: Carrier, Personnel: Full Tracked, Armored, M113A11
9-2320-218-10	Operator's Manual for Truck, Utility: 1/4-Ton, 4x4, M151, M151A1, M151A2
9-2320-246-10	Operator's Manual: Truck, Platform, Utility, 1/2-Ton, 4x4, M274
9-6130-470-12	Operator's and Organizational Maintenance Manual for Battery Charger PP 4884 (XO-1)/T
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11-5820-667-12	Radio Set AN/PRC-77
11-5855-254-14&P	Operator's Organizational, Direct Support, General Support Maintenance Manual Including Parts and Special Tools List for Battery Charger PP 7382/TAS
11-6665-214-10	Operator's Manual: Radiacmeters IM93/UD, IM93a/UD, and IM147/PD
11-6720-253-10	Operator's Manual for Camera Set, Still Picture KS-99C
38-750	Army Maintenance Management System (TAMMS)
57-220	Technical Training of Parachutists

TRAINING CIRCULARS (TC)

6-40-4	Fire for Effect, Parts 1, 2, and 4
23-2	66mm Rocket Launcher M202A1
23-23	TOW Heavy Antitank Weapon System
23-24	Dragon Medium Antitank Assault Weapon System M47

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71-5

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948-071-0023-F	TOW Fire Commands
948-071-0024-F	Loading, Tracking and Firing the TOW
948-071-0025-F	The TOW/APC System
948-071-0026-F	The TOW 1/4-Ton System
948-071-0027-F	Maintenance of the TOW System
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010-071-6605-F	FDC: Basic Plotting Techniques, Part IV
010-071-6606-F	FDC: Formulating Fire Commands
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010-071-6609-F	FDC: Completing the Computer's Record, Part II
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010-071-6635-F	Prep to Fire: Boresighting the 81mm Mortar
010-071-6636-F	Prep to Fire: Laying 81mm Mortar with Aiming Circle
010-071-6637-F	Prep to Fire: Referring Sight, Placing Aiming Posts
010-071-6638-F	81mm Mortar Ammunition
010-071-6639-F	Misfire Procedures
010-071-6640-F	Proper Maintenance of 81mm Mortar
020-071-1051-F	Control Rate and Distribution of Fire
020-171-1611-F	Target Range Determination
020-171-1613-F	Use of Binocular Reticule and Worm Formula
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201-113-4502-F	Preparation of Radio Set AN/PRC-77 for Operation, Part II: Operation Checks
201-113-4503-F	Preparation of Radio Set AN/PRC-77 for Operation, Part III: Pre-Sets
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930-071-0014-F	Measuring Distance and Azimuth
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930-071-0016-F	Terrain Features
930-071-0017-F	The Lensatic Compass
930-071-0018-F	Land Navigation With a Map and Compass
935-071-1027-F	Analyze Weather and Terrain
935-071-1028-F	Processing Captured Personnel, Equipment and Documents
936-061-0109-F	RTP Part 2, Writing Down Messages Received by Radio
936-061-0111-F	RTP Part 4, Preparing Messages To Be Sent
936-061-0112-F	RTP Part 5, Sending and Receiving Messages
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937-061-0030-F	Cover, Camouflage, and Concealment, Part I
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940-071-0088-F	M203 Grenade Launcher: Zeroing and Target Engagement
948-071-0005-F	Operating the LAW
948-071-0022-F	Prepare the TOW for Ground Operations, Part II
948-071-0023-F	TOW Firing Commands
948-071-0024-F	Loading, Tracking, and Firing the TOW
948-071-0150-F	Dragon Maintenance
949-061-0001-F	Determination of Direction
949-061-0002-F	Target Location: Polar Plot, Grid Coordinates (Revised)
949-061-0003-F	Locate a Target by Shift From a Known Point
949-061-0004-F	The Call for Fire (Revised)
949-061-0005-F	Adjustment of Indirect Fire by the Bracketing and Creeping Methods, Part I
949-061-0006-F	Adjustment of Indirect Fire by the Bracketing and Creeping Methods, Part II

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952-061-0051-F	Expedient Early Warning Devices, Part II
952-061-0054-F	Early Warning Devices: Electronic, Part I
952-061-0055-F	Early Warning Devices: Electronic, Part II

*USAIMA SPECIAL TEXTS (ST)

31-194	Fingerprint Identification System
31-201	Special Forces Operations

OTHER PUBLICATIONS

CFP 317(6) Canadian
Janes Infantry Weapons
AF Manual 64-3, Survival
TRADOC Training Text 6-20-7
**ST 7-270-FY78

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FM 31-11C-S

This is a new manual. We need your help to improve it. Take a few minutes and give us your suggestions. If you need more space, continue on a blank sheet of paper.

1. Is this manual easy to read and understand? Yes ___ No ___
2. Are the tasks written in sufficient detail? Yes ___ No ___
3. Do the CONDITIONS contain all items necessary to perform the tasks? Yes ___ No ___
4. Are the PERFORMANCE MEASURES written in sufficient detail so that you can perform the task? Yes ___ No ___
5. Are there tasks that should be added? If so, please list. Yes ___ No ___
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FM 31-11C-S

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